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VOLUME TWO

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CHAPTER SIX

ENGINEERING SUPPLY LINKAGES AND THE UK

DEEP MINING INDUSTRY

'... the coal mining industry exerts a considerable economic dominance upon areas that have been or are subject to mining. Investment in coal mines and associated plant, and the operation of such capacity, represent major inputs into local economies. The coal industry is also an important consumer of industrial goods and services, a significant supplier of raw materials and, both through direct taxation and through expenditure of employees, makes substantial contributions to local, public and private incomes' (Roberts, 1986:7).

'Loss of jobs in the coal industry marks only the beginning of a process of employment decline and community decay. While the direct effects of coal mining job loss are obviously severe, the indirect, or "knock-on", effects can be equally severe' (Hudson, Sadler and Peck, 1984:96).

As pointed out in the previous chapter the positive purchasing policies of British Coal (formerly the NCB) have led to a predominantly British based engineering supply network, and to close technical collaboration between the public and private sectors. This has enabled the development of an intricate infrastructure comprising hundreds of service and material suppliers to the coal industry. This chapter examines the effects of current British Coal restructuring on the industrial structure and performance of its suppliers of underground plant and machinery. It also examines the geography of supply and considers the links between the spatial pattern of coal mining activity (and pit closures) and local manufacturing activity.



The focus here is on deep mining engineering linkages for two main reasons. Firstly, Britain's coal industry structure has been built up around deep mining, which is the major specialism of the UK mining machinery manufacturers who have developed equipment dedicated to the mechanised longwall system of mining (see Chapter Five). Secondly, the opencast mining industry requires a completely different range of plant and machinery to deep mining, and as a result many of its suppliers are different from those supplying collieries. Furthermore, as open cast mining is essentially carried out by private contractors relations between buyer and suppliers of equipment are different to those for deep mining. So opencast engineering linkages are treated separately in the following chapter.

Chapter Six is split up into two parts, as well as divided into sub-sections. Part One focusses on the broad level changes affecting the whole of the deep mining machinery industry and its links with the UK coal industry. Part Two is more specifically focussed on two geographical areas, Yorkshire and the north east of England. This allows a more detailed empirical description of the diverse engineering linkages with the coal industry and of the multiplier effects of coal industry contraction on supply networks and public-private sector relations.

PART ONE

6.1 Linkage Multipliers

Hitherto, many studies have focussed on the problems for colliery communities associated with over-dependence on a single industry - coal mining; upon the various economic, environmental, social, and unquantifiable costs of colliery closures in coalfield communities; and on the problems of reindustrialisation in declining coalfields (1). This chapter considers "multiplier effects" resulting from colliery closures that go beyond the coalfields and their communities.

Two main types of "multiplier effects" are identified as being of significance in leading to non-mining and mining related job losses following pit closures. The most immediate are "income effects", which result from a permanent loss of jobs and income to communities subsequent to the closure of the dominant local source of employment. The reduction in disposable income and purchasing power, particularly if no alternative employment opportunities are locally available, has a depressing effect on a range of local shops and services. This depressing effect is all pervasive, and it can even destroy those welfare and community support facilities traditionally kept alive by collective self-provision. In short, unless coordinated action is taken on a sufficient scale and at the appropriate levels by both central and local government, a cumulative process of social decay sets in, ultimately killing off a valued way of life in the mining communities (see Hudson, Peck & Sadler, 1984; Rees, 1986; memo. 62 to the Commons Energy Committee).

Income effects are certainly pronounced at the level of coalfield communities, but this may not necessarily be the case for "linkage multiplier effects". In fact, local studies have shown that linkage effects, i.e. effects on those industries and jobs related to coal mining, can be relatively minor. Much obviously depends on the local industrial structure and size of the district or area under study. It will also depend on the nature and extent of inter-industry relations with British Coal (BC) in the locality, and on the extent of national, area, and colliery level purchasing and interaction with local businesses.

This chapter focusses on the linkage multiplier or "knock on" effects of BC policies and industrial restructuring on engineering suppliers. In reality there are a great diversity of material (manufacturing) and service industry linkages with the U.K. coal mining industry (Table 6:1). It is necessary to not only distinguish between the two types of multiplier effects, but to distinguish between the different sets of linkage effects. Engineering supply linkages with British Coal span a heterogeneous range of products and companies covering various aspects of the coal chain, including the production of capital goods for both deep and opencast mining; surface plant associated with collieries; coal using technologies; coal-fired power plant (see Figure 6:1); and most branches of engineering activity - civil, mechanical, electrical and electronics.

So it is useful to be precise about which groups of suppliers and linkage effects one is discussing. As Hudson, Peck and Sadler (1984:96-97) noted,

'While ... multiplier effects represent distinct analytical categories, in practice they are extremely difficult to identify and measure, in total and separately. The main reason for this difficulty is the great diversity of activities which are affected. This diversity means it is impossible to find systematic sources of information, and unwise to apply assumptions which cover the whole range of multiplier effects.'

The study of engineering linkages is highly relevant to the current campaign for coal. This paper will raise a number of interrelated points that should be considered by the Government, energy analysts, British Coal, and local authorities when making energy related decisions, such as:

- (1) There are thousands of engineering jobs related to the U.K. coal industry. These are found in hundreds of private sector firms spanning numerous industries (see Figure 6:1).
- (2) Although many of the mining related engineering firms are located within or close to areas of coal mining activity, mining engineering employment is not confined to the coalfields. The study of these linkages is, therefore, one way of examining the relations between coalfield communities and other geographical areas, communities, and parts of the national economy. The "knock on" effects of colliery closure go well beyond the localities immediately affected.
- (3) Privatisation in all its guises (deregulation, contracting out, competitive tendering, denationalisation) is currently a top government priority. It has already affected oil and gas, and is now affecting coal's major market, electricity supply. BC is next

on the list. It is important to make at least some assessment of how privatisation will affect BC's future prospects, and in consequence, those of BC's engineering suppliers.

6.2 Industrial Structure and Relations with British Coal

As pointed out in Chapter Five relations between the Coal Board and its machinery suppliers have been very close, particularly with regard to technical collaboration (Townsend, 1976). This was noted by Lord Ezra, former NCB Chairman, who described "the mutually beneficial inter-relationship" between the public monopoly buyer and its private sector suppliers as one of "the most positive" features of nationalisation in Britain. He argues that,

'a positively oriented purchasing policy helped to spread competitiveness in important parts of the private sector, especially in machinery and equipment' (Ezra, 1987:44-45).

Not everybody agrees with Ezra's viewpoint that coal industry public-private sector relations is one of the main success stories of nationalisation. In fact, Allen (1981:111) has argued that one of the biggest failings of state ownership was its lack of vertical integration, including the failure of the NCB to manufacture its own capital goods needs (see Chapter Three). He observes,

'It should have been clear all along that the social objectives of nationalisation could not be achieved while the coal industry could be exploited by private manufacturers.'

As noted earlier (Chapters Three and Five), the Coal Board's technical research and development facilities, its innovations, and its testing facilities have effectively served as a public subsidy for the profit making activities of private mining machinery companies.

It is not an aim of this chapter to discuss how the Coal Board's (British Coal's) relations with the private sector have restricted its ability to meet "social objectives". For a variety of reasons the Coal Board has become dependent on hundreds of suppliers, and in turn, suppliers have varying degrees of dependency on the monopolistic British Coal market. It is in the market for deep mining machinery that those public-private sector relations can best be described as symbiotic. This is the result of the dominant methods of coal production and the structure of coal ownership.

In Britain about 85 per cent of coal comes from underground mines, mainly utilizing the mechanised longwall method (Figure 6:2). Between British Coal and its primary suppliers of longwall equipment relations are especially close. As a monopolistic buyer British Coal exerts a powerful influence on the structure of mining machinery markets, and it normally purchases around 80 per cent of the output of the underground equipment industry (NEDO, 1985).

British Coal can use its position to deliberately limit the number of suppliers, or it can encourage more suppliers into the home market. In the past the Coal Board (BC) has tried to maintain a degree of technological and commercial competition between suppliers of important products, and tried to maintain at least three or four suppliers in major product markets (see Table 6:2). In practice, this has not

always been possible in some product markets, where only one or two suppliers are in virtual control of supplies (see Table 6:3).

In spite of continued colliery closures and the long term decline in coal capacity since 1956, the mining machinery industry has undergone only two major periods of restructuring. These have come, not surprisingly, during the periods of most intensive pit closures. At the peak of the sixties' closures, in 1968-69, the home coal industry was deliberately rationalised under the auspices of the Labour government's Industrial Reorganisation Corporation (IRC) (see Chapter Five). This was due largely to short term market considerations. The Coal Board's assumption that the home market for mining machinery would create over capacity for suppliers of longwall machines proves to be false. Following the revival in coal demand after the 1973-74 oil crisis, and the increased capital investment after Plan for Coal (1974), suppliers were faced with full order books and many had difficulty meeting NCB deadlines. The irony of all this is that in the 1980s government policies and the actions of British Coal may well lead to the sudden reversal in coal policy in the 1990s similar to that which occurred in the 1970s. For the time being the emphasis is on liquidation, rather than preservation, of coal capacity. It is pertinent to consider some of the characteristics of the home market for mining machinery in order to assess some of the likely effects of current coal industry restructuring on suppliers.

Industrial Concentration

Owing to take-overs and merger activity, as well as the establishment of new plants as companies have expanded, the engineering

supply network for the coal industry is dominated by a small number of diverse engineering groups, such as FKI Babcock, the General Electric Company (GEC), Northern Engineering Industries (NEI), Hawker Siddeley, Dowty and Dobson Park Industries (see Figure 6:3). The first four named groups all have interests in the electricity generation industry, and their restructuring activities in the eighties are influenced as much by the impending privatisation of the electricity supply industry (ESI) as by the downturn in British Coal demand, although both events are related. The Dowty Group has diverse involvements in four main divisions - aerospace, electronics, industrial and mining (see Figure 6:4). Only Dobson Park Industries of the large groups is involved in mining engineering as its primary activity (see Figure 6:5). These six groups together own 23 of the 93 member companies of the Association of British Mining Equipment Companies (ABMEC). In addition to the engineering groups concerned there are other principal suppliers, like Anderson Strathclyde, with more than one mining division and several manufacturing plants in the UK. Hundreds of medium-sized and smaller engineering concerns supply mining plant and equipment to British Coal either as a primary business or as one of several market interests. --

"Thinking British"

The Coal Board's "Think British", although not always "Buy British", purchasing policies mean levels of import penetration are as low as three - four per cent for many items of mining machinery. BC has only encouraged overseas companies to establish production centres within the U.K. where they are considered to have unique or superior equipment to those produced by British owned firms (2). And very few

longwall manufacturers import equipment into the U.K., although a notable exception is Eickhoff (West Germany) in the coal shearer market (see Table 6:3).

Positive purchasing, a monopolistic buyer and close technical relations mean the home market is more important to mining machinery firms than it is in many other engineering industries where there are several domestic customers and import penetration levels are usually higher. The Association of British Mining Equipment Companies (ABMEC) stresses the importance of the home market as a spring board for members' export success. In ABMEC's memorandum to the Commons Energy Select Committee (mem. 30), they stressed the importance of coordinating forward planning and purchasing procedures to enable suppliers to plan efficiently and make informed business decisions regarding future output, resources, investment requirements. Conversely,

'a change in plan can have a quite dramatic effect upon the manufacturer's activity'.

6.3 Engineering Jobs linked to deep mining

The British Longwall Mining Association (BLMA), comprising eight longwall equipment manufacturers (who are also members of ABMEC), argue that there are approximately 50,000 jobs in the mining machinery industry, mostly in areas of high unemployment. This is roughly the number of employees in ABMEC.

The BLMA were referring to a whole range of suppliers listed under a diverse range of activity headings, including producers of communications, signalling equipment, electrical switchgear, electronics, transportation equipment and surface plant. If we just take the "core" mining machinery industry - defined by Standard Industrial Classification activity heading 3251 (see definition to Table 6:5) - the industry employed over 23,000 people in 1978. During the decade since then it has lost a third of its total employees. In 1988 the industry employs around 14,500 people. But these figures underestimate the total numbers employed, partly because of incomplete coverage (see Notes to Table 6:5), and partly because secondary suppliers and sub-contractors are excluded. If these allowances are made the mining machinery industry probably employs some 25,000 people, which was the figure given by NEDO in 1986 to the Energy Committee (vol. 1, memo. 61).

As indicated above, the "core" mining machinery industry in no sense covers all British Coal's deep mining engineering suppliers. If the associations covering British Coal suppliers in the coal preparation plant and mechanical handling engineering companies are added to ABMEC member companies there are at least some 110 companies employing around 60,000 - 65,000 people involved in coal industry related work (3). This permits a crude estimate that for every two mining jobs there is at least one coal related engineering job. But the ratio may be closer to one if sub-contractors and secondary suppliers are included.

In common with other industries complex supply chains exist within most product markets, but it is especially important where there is a monopoly buyer like British Coal (see Figure 6:6). Reduced demand at the top has repercussions throughout the supply chain. Most major suppliers of mining machinery have their own subsidiaries, subcontractors and supply networks. Suppliers can include other mining machinery firms, general engineering companies carrying out basic machining and fabrication work, suppliers of specialist raw materials and components. Each major item of machinery can be made up of sub-assemblies manufactured by different firms. For example, coal shearers require special cutting picks, disc drums, underframes, and microprocessor control devices, in turn, each of these products require special raw materials and components. So although there may only be three principal sources of complete coal shearers for BC (see Table 6:3), there are numerous other firms engaged in their manufacture. As one engineering union (AEU) convenor of an important shearer maker put it,

'If our company goes down the tubes we'll drag a lot of small firms with us' (Beveridge, interview 1985).

The fact that BC buys a diverse range of products and supply chains include firms which are neither listed as mining machinery suppliers nor do they belong to the main associations covering major BC suppliers, adds to the difficulty of assessing employment linkages. It also means that coal related engineering networks include companies in various parts of the UK well beyond the coalfields. Nevertheless, most clusters of mining machinery activity are concentrated in areas of past or present coal mining activity, or adjacent to such areas. In some

specific localities, mining engineering represents a dominant source of male employment and apprenticeships in local labour markets, as well as a significant concentration of technological resources and skills. This is the case for several companies - Gullick Dobson in Wigan; Anderson Strathclyde in Motherwell; British Jeffrey Diamond in Wakefield; and Dowty Mining Equipment in Aschurch (Tewkesbury), to name a few.

6.4 Pressures on Suppliers in the 1980s

Owing to the lack of anything resembling a national energy policy, in outline or in detail, there has been little opportunity for really effective coordinated long-term planning within or between any of the energy industries, except for the nuclear power programme. Plan for Coal in 1974 led to increased investment in major projects such as the Selby complex, which fed through into demand for mining equipment (see Chapter Four). But the Plan on its own could not be carried through unless central government attempted some measure of production planning and supply control in the other energy industries, which did not happen. The result was that the mining engineering companies were led into a false sense of security. Even as late as 1979 many manufacturers were planning on the basis that domestic coal capacity would be as the NCB forecast, that is around 135 million tonnes of coal (including 15 m.t. opencast) by the mid-1980s. Longer term assumptions were for a British coal output of about 170 m.t. (20 m.t. opencast) by the year 2000 (see NEDO Mining Machinery Sector Working Party, 1979).

As Fenton, Managing Director of Huwood Limited, describes,

'Manufacturers reacted to the "Plan for Coal", committed investment and resources to meet the envisaged opportunities' (The Mining Engineer, August 1987:52).

Fortunes changed rapidly in the mining equipment sector. In 1981/82 the Coal Board's total capital expenditure was £715 million, which was £86 million down on 1980. During the same year ABMEC members cut employment by around 6,000 people. Not all of this would be due to loss of NCB contracts, for many firms had business in other areas of the economy hit by recession, but job losses were attributed to the loss of coal orders (Financial Times, 25-09-81:7). Over the next four years NCB orders for underground equipment halved. During the 1984/85 coal dispute numerous machinery makers introduced short-time working, and some suppliers cut jobs. Some of the larger suppliers discontinued sub-contracting with other firms. Just how many smaller secondary suppliers and sub-contractors were affected by reduced orders from the primary manufacturers is not known.

All the major energy groups and primary suppliers to the NCB recorded big reductions in coal related business during the miners' strike. Before the strike Anderson Strathclyde, part of Charter Consolidated, had an annual turnover of £155 million, of which over £60 million represented NCB contracts. The company reckoned the strike reduced NCB business by a third, i.e. about £20 million. Of the company's total workforce of some 3,600 people in the UK, about 3,000 employees were on short-time working arrangements. Babcock International's (now FKI Babcock) NCB related sales were cut by over 40

per cent. NEI's mining division, supplying a range of products from locomotives and winding gear to electrical and electronic equipment, had put most of its 1,400 workers on short-time. Another 2,500 workers were on short working weeks at Dowty's roof support and conveyor companies. Dobson Park, Mining Supplies (MS) International at Doncaster, and all the Hawker Siddeley mining industry suppliers recorded big falls in coal mining related profits. MS International announced a drop into the red in the first half of its 1984/85 financial year. One Financial Times article posed the question,

'Will the ending of the strike mean a sudden upsurge in orders for the equipment industry? No, is the consensus among those companies willing to talk, for the industry is a tight-lipped one and especially so at such a sensitive time' (FT, 21-03-85:10).

Those manufacturers who were expecting a big upturn in orders from the Coal Board following the strike were quickly to be disappointed. With the exception of some items of heavy duty machinery, such as powered roof supports from Dowty and Gullick Dobson who were both given orders in preparation for the start up after the strike, most manufacturers were left with large stocks of equipment which had no immediate use. Companies without export markets were suddenly forced to look abroad.

Fortunately for the larger mining machinery companies exports increased during the strike period, especially to the USA, China, Australia and South Africa (see Chapter Seven). ABMEC's 1980 sales total was almost £1,000 million, of which £128 million worth of equipment was exported (i.e. 13 per cent of the total). In 1984, the

industry's total sales were 30 per cent down on 1980, at about £700 million, of which some £196 million worth was exported (28 per cent) (ABMEC, 1986). In fact, during the period of the strike, ABMEC's export earnings rose by 15 per cent to £213 million.

The reasons why there was no massive upturn in the home market after a year long strike had much to do with energy market constraints, and the financial constraints imposed on the NCB by the government (see Chapter Four). Even before the strike some companies had complained of NCB deferrals of outstanding bills with manufacturers due to the tightening of its external cash limits. In January 1981 a delegation of mining equipment companies met Sir Keith Joseph then the Secretary of State for Industry, to discuss the problems created for suppliers by the government's spending cuts, including the financial restraints on the Coal Board (Newcastle Journal, 31-01-81:9).

A technical reason for the lower NCB expenditure after 1984/5 than before it was the fact that the Coal Board continued to order new plant and machinery during the strike... Owing to long lead times between purchase and installation much of the machinery was lying idle before going into mines. Nevertheless, the Coal Board's ordering programme for spares and replacements was reduced by about 60 per cent from between £100-120 million down to £45 million during the strike (FT, 21-03-85:10).

As a result of the cut-backs during the strike, mining machinery employment in SIC activity heading 3251 had declined by about 16 per cent, from 18,748 employees in 1983 to 15,720 people in 1985 (see Table 6:6). In reality, the employment reductions in the engineering supply

industry, broadly defined to include electrical and electronic equipment makers as well as mechanical items, was probably around 13,000 people (The Mining Engineer, August, 1987:54). Although a number of mining machinery firms re-employed people made redundant during the strike, employment levels remained at least ten per cent lower than pre-strike levels, and have never picked up.

Since the end of the miners' strike, which was essentially about the NCB's pit closure programme, the NCB was able to carry out its plans to cut capacity. Many of the Coal Board's primary suppliers adopted strategies of diversification in both products and markets. It was obvious that the NCB's desire to become more efficient in financial and productivity terms within the credit borrowing framework set by the government was going to lead to a reduction in total home demand for all kinds of equipment. The problem was how much would the reduction be, how fast, and which product markets would be most adversely affected?

In 1985, NEDO's Economic Development Committee on the mining machinery industry concluded that the Coal Board's plans to reduce the volume of business to about 30 sets of face equipment a year, all heavy-duty, and its increasing emphasis on increasing machine performance and reliability, would lead to rationalisation in the longwall equipment supply industry. In fact, the Coal Board's strategy since 1985 has been to concentrate production on fewer and fewer capital intensive, high output faces, which has reduced new complete face installations to about 20-25 each year and this amount is likely to be reduced even more by the early 1990s. The total number of coal faces in operation at the end of the 1987/8 financial year was 284,

some 50 faces less than the previous year, and 250 less faces than 1983/4. British Coal's 60 per cent overall increase in productivity since the strike has been partially achieved by the closure of collieries and reduction in working faces by nearly half pre-strike levels. This has reduced total deep mine output by only 7.7 million tonnes, from 90.1 mt to 82.4 mt over the same period (BC, 1988:19).

According to Northard (1987), BC's Operations Director, much of the 35 per cent improvement in labour productivity in BC in the two years from September 1985 to September 1987, was the result of new technology (see Chapter Five). Certainly, BC's attempts to become even more capital intensive, to raise capital productivity, and to move towards greater flexibility of production whilst reducing its so called "high cost" capacity, has meant that annual capital expenditure on equipment has remained high in spite of many colliery closures.

British Coal Capital Expenditure, £ millions

	1985/6	1986/7	1987/8
Major colliery projects	236	280	318
Total mining capital expenditure	643	645	640

Source : British Coal Report and Accounts, 1986/7 and 1987/8

Orders for heavy-duty coal face equipment, including power loaders, shield supports and armoured face conveyors (AFCs) have continued to fill manufacturers' UK order books, although the number of complete coal face installations has decreased. Some manufacturers have actually increased sales to British Coal since 1983/4. This is partly the result of an increase in the capital costs of equipment. As

manufacturers have increased the reliability and durability of their heavy-duty machines to meet with BC specifications, so costs have risen. A single complete face installation costs around £5-6 million. It is also true that British Coal's efforts to raise productivity by increasing the number of retreating coal faces and by applying American style working practices, and methods of production to some extent, has increased demand for certain specialist items of equipment (see Chapter Five). These include more tunnelling machines and more powerful roadheaders to increase the speed of roadway drivages, an increased use of roof-bolts instead of steel arches to support roadway roofs, and greater use of free-steer vehicles underground for people, materials and coal transportation (The Mining Engineer, June 1987). Not surprisingly, the manufacturers of such items have benefitted in the short and medium term from British Coal's restructuring.

The important point is that there are increasing signs that British Coal will reduce its lists of preferred suppliers of major items of mining plant and equipment. Although since the 1984/5 strike BC has kept loyal to a few primary suppliers of important high cost capital goods it is having to be more selective in its choice of suppliers. NEDO's EDC on the mining machinery industry foresaw this in 1985.

'It is our belief that the future volume of business available (about 30 sets of face equipment a year, all heavy duty) will not be sufficient to sustain more than two British firms at a profitable level of production for most items' (NEDO, 1985:54).

Pressures for a rationalisation of the capacity of BC's supplier network are greater now than in the late 1960s, the last period of intensive merger activity (see Table 6:7, and Figure 6:7).

Whilst the ultimate goal of British Coal is to apply electronically controlled, heavy duty machinery to all its remaining faces, a task which is presently 40 per cent complete, there is considerable uncertainty about the future of the deep mining industry. If Government policies do not change, British Coal will face unfair competition from a protected home market for nuclear power and from imported coal. Privatisation of the electricity supply industry will also intensify competition between coal, oil, gas, and even renewable energy sources.

As noted above, the last major period of rationalisation among longwall suppliers was in the late 1960s. Like the 1980s they were years of cuts, closures, and mining job losses. The enormous folly of the draconian rationalisation in coal production capacity was realized by all when world oil prices increased in the following decade. The fact was that the coal industry was ill prepared for its change in fortunes, primarily because of the enormity of the pit closure programme - some 400 pits shut within a decade - which preceded the market upturn for coal.

Past mistakes have had little or no influence when it comes to UK energy matters. Yet again the coal industry is on the brink of crisis. Electricity privatisation and unrestricted coal imports threaten coalfield communities with destruction. If British Coal is forced to cut more capacity in the next few years due to short term financial and

commercial reasons, it is highly likely that there will need to be rationalisation within the longwall and associated equipment industries. Unlike the 1960s, when rationalisation took place from a much higher base, the consequences of reduced capacity now will seriously damage Britain's ability to raise deep mining production in future. This is due to the irreversibility of pit closures, sterilization of coal reserves, and of concern here, due to the consequent loss of productive capability within the engineering sector. The situation is much more acute than twenty years ago. Action is needed now to prevent an irrevocable decay of the coal chain infrastructure.

In response to the serious threats to the home mining equipment business, the British Longwall Mining Association (BLMA), launched their own publicity campaign to persuade the British government to adopt a "pro-British coal" energy policy. The BLMA stress the substantial productivity increases achieved as a result of modern mining technology and methods. They argue that British Coal should be allowed to proceed with its current objective of introducing electronically controlled heavy duty equipment on all working faces to reduce operating costs and coal prices. Pit closures have taken place after substantial capital investment in them, which writes off at least £50 million worth of equipment for modern collieries.

In the BLMA's memorandum to the Parliamentary Energy Select Committee (1986, vol. 1, memo. 31), they stressed that

'a pre-emptive move towards nuclear power before the substantial cost reductions in the U.K. coal production are achieved would be detrimental, not only to the coal industry itself, but also to the whole of its infrastructure.'

The BLMA points out that the Sizewell Inquiry seriously underestimated the strengths of coal as an energy resource, and it overestimated the future costs of producing coal and of coal prices.

Irrespective of what happens to the British nuclear programme, the most immediate threat to coal comes from cheap foreign imports of coal, and there is the added uncertainty about future power station demand as a result of the proposed privatisation of the electricity supply industry (ESI) (see following Chapters). An increase in coal imports of up to 30 million tonnes by the mid-1990s would reduce the deep mining industry's output to around 50 mt. This would obviously reduce the home base for mining machinery manufacture quite considerably. Dewhirst and Gladstone (1988) attempted to study the employment effects of the ESI's privatisation on linked industries (see Figure 6:8). They estimated that there were "just over 58,000 .. jobs dependent on the coal industry's sales to the electricity supply industry". From this they extrapolated that ten million tonnes of coal imports would cost nearly 8,000 coal-related jobs in the wider economy, whilst 30 mt would cost 23,000 jobs. Many of these would be in the deep mining engineering industry.

ABMEC members have argued that a further decline in domestic coal mining capacity will weaken the export potential of the industry as a whole. In the past British Coal's laboratory and underground mine equipment testing facilities have proved to be an invaluable "shop window" to promote UK mining equipment to potential overseas customers. BC have reduced its R & D expenditure and has adopted a policy of charging manufacturers for testing equipment. Furthermore, BC's whole purchasing policy has since 1985 been based increasingly on lowest

price criteria. Whilst this has intensified competition amongst UK based suppliers, it has also opened the home market to the possibility of more import penetration if foreign suppliers are successful in competing on cost. Fenton (1987) explained the new profit-oriented British Coal management view as,

'There must be no innovation for innovation's sake. Any design changes or new equipment must guarantee benefits to the bottom line. Equipment operating abroad will now be allowed into the UK on proof of its track record or accredited foreign approval' (The Mining Engineer, August 1987:55) (author's emphasis).

BC's tougher competitive line with its suppliers is part of the broad business reorganisation and changes in management objectives and philosophy associated with the politically-motivated pressures upon the corporation, including stricter financial control and the privatisation of ancillaries (see Chapters Three, Four and Five).

Merger Activity

In the late 1980s, mining machinery companies, or their parent companies, are seeking to diversify into more profitable business areas and product markets away from dependence on a shrinking, unstable domestic industry. Some companies have already become locked in merger battles fighting for shares of a reduced British Coal market. The position of the hundreds of secondary suppliers (i.e. suppliers to the machinery firms), sub-contractors, and companies for whom the coal industry represents one of several markets is less clear. It is obvious that many firms highly dependent on BC or BC suppliers' contracts (i.e. over 50 per cent in terms of annual turnover) will need

to reorganise business and production, find new markets, develop new products, merge with other companies, or face bankruptcy or closure. Some firms may be able to hold onto their share of a smaller BC market, but there will also be many losers if deep mining continues to contract.

Industrial restructuring via merger activity is taking place to some extent. Probably the most significant is Dobson Park Industries' £33 million takeover bid in March 1988 for Mining Supplies International at Doncaster, because both concerns are primary suppliers to BC, although in different product markets. The industrial logic behind the bid was for Dobson Park to become a more integrated mining equipment supplier by adding MSI's coal cutters to Dobson's substantial involvements in mining equipment via its subsidiaries - Gullick's (Wigan) roof supports, Fletcher Sutcliffe Wild's (Wakefield) armoured face conveyors, and Pitcraft Summit's (Barnsley) chainless haulage system.

Initially Dobson Park failed in its outright takeover attempt but raised its shareholding in MSI to 29.8 per cent (FT, 26-03-88:8). In July 1988 the company agreed to pay £12.5 million cash for the mining equipment division of MSI. The acquisition reflects the concern about the future level of demand from BC. Dobson Park Industries has engaged in a diversification strategy in the 1980s. In 1987, it bought IRD Mechanalysis, an industrial electronics company in Columbus, Ohio, for \$24.25 million (US). So Dobson added an electronics division to add to other non-mining related divisions, such as power tools (Kango Wolf) and the manufacture of toys (Britains Petite). Other acquisitions include a 37.5 per cent holding in Instem plc, and the purchase of the

net assets of Presswell Engineering Limited for £360,000. The Presswell purchase diversifies its mining market interests, for the company is engaged in making high fluid pressure equipment for underground mines, as well as hand pumps for tightening industrial fasteners.

The addition of Mining Supplies (Longwall) to its overall operations makes Dobson Park one of the strongest and better placed mining machinery suppliers in the UK. Nevertheless, it has tried to reduce its total business dependency on British Coal, whilst retaining its 50 per cent market share for powered roof supports. Alan Kaye, Dobson's chief executive, is reported to have stated that the group's first priority would be to make further inroads into industrial electronics (The Guardian, 29-07-87:29). In contrast, Mining Supplies (Longwall) was almost totally dependent on the coal market, and suffered much reduced domestic orders after 1984/5. In the year ending April 1988, the company made a £1.4 million operating profit on a turnover of £25.2 million, which was partly due to increased exports (4). But the company's problems are best illustrated by its employment cuts. From a late 1970s peak of around 2,000 jobs in the longwall equipment plant it has had a series of major redundancies cutting employment to fewer than 300 people.

Dobson's main rival in the powered support and conveyor markets is the Dowty Group, which has also made purchases in the UK coal supply industry, and has increased its mining equipment exports to over half of total mining sales. An important acquisition was J. Jones Automation Limited of Nottingham, which became Dowty Automation Systems Limited, manufacturing flameproof and intrinsically safe monitoring in

mines, and a range of remote control and monitoring equipment. This adds considerably to Dowty's involvement in microprocessor based systems for mining applications. In many of its mining exports Dowty is supplying the software expertise and control systems, whilst local manufacturers do the main fabrication and assembly work (Walker, interview, 1985). Other engineering groups have also increased their business involvements in mining electronics and control technology. In 1987/8, FKI Babcock added Stedfast Electrical Controls to Huwood Electric to form Huwood Control Systems Limited, which makes a wide range of signalling, communication and monitoring equipment.

The above mergers reflect the desire of major BC suppliers to consolidate their home market positions by buying other mining equipment suppliers, particularly in related items of equipment (5). Dobson Park has the capability to sell complete coal face packages, which was formerly only possible in collaboration with other suppliers. Dowty has also sought greater integration, although it does not manufacture complete longwall face installations "in house" it is now a leading supplier of electro-mechanical systems for mining. Nevertheless, even Dowty, one of the industry's leading firms worldwide, is moving out of the mining supply business (see concluding chapter).

6.5 Intra-sectoral linkages and local supply networks

Although "linkage effects" have been found to be of less local significance than "income effects" in areas of colliery closures, it is important to emphasize the nature of the current rationalisation of

deep mining capacity. Undoubtedly, the so-called peripheral coalfields of Scotland, Wales, the north east of England, the north west and Kent have lost most of their working collieries, and output has increasingly become concentrated in "the central coalfields" of Yorkshire and the Midlands (see Winterton, 1985). Nevertheless, all the coalfields and British Coal areas have had some pit closures, and further capacity cuts in future are likely to hit "the high cost tail" of the central coalfields. The scale of the deep mining industry's decline is more disturbing to the majority of engineering suppliers than the geography of closures. Most British Coal machinery and plant purchases are centralized rather than arranged on an area-by-area basis; although obviously an assessment of the needs of each area or coalfield is part of the business of ordering new equipment. Reduced capacity and tighter financial controls on all BC operations has led to a decrease in purchasing power, which is affecting a wide range of underground mining product markets, and this will have linkage multiplier effects in areas where mining machinery firms are located.

As Figure 6:6 attempts to show, intra-sectoral linkages are a feature of British Coal's supplier networks. Cuts in orders to a primary (i.e. direct contract) supplier may reduce orders to a variety of secondary suppliers of raw materials, components, spares and services. By sub-contracting BC's larger suppliers generate work for several companies within and outside their immediate local districts or regions. The local significance of Anderson Strathclyde's (AS) subcontracting was stressed by the Scottish Development Agency (SDA), the Scottish Economic Planning Department (SEPD), and several regional and local authorities to the Monopolies and Mergers Commission (MMC), which investigated the company's take-over by Charter Consolidated in

1982. They stressed that AS's importance lies not only in the towns and areas where its plants are sited, but to the whole of Scotland. At the time of the takeover Anderson Strathclyde was Scotland's fourth largest manufacturing employer, one of the very few genuinely indigenous companies with headquarters' control in the country, and 67 per cent of its components suppliers were Scottish, against an industrial average for Scotland of 24 per cent (see Table 6:8).

At the time of the takeover there was much concern that Charter Consolidated would reduce the management autonomy AS had enjoyed, and employment levels at AS plants. The Amalgamated Union of Engineering Workers (AUEW) threatened not to cooperate with Consolidated over the introduction of a £6 million flexible manufacturing system (FMS) at the Motherwell plant (FT, 23-03-83:7). Management were less worried about the possible consequences of the Charter takeover, and in evidence to the MMC (1983, para. 8.59) they stressed potential advantages to the Scottish economy.

'The introduction of new types of employment (such as motor car assembly plants, electronics and oil-related engineering) into Scotland had of necessity often been dependent upon manufacturers with headquarters elsewhere. Inward investment of this type had been crucial to the restructuring of the Scottish economy. Therefore there would clearly be circumstances in which the loss of local control might be offset by other considerations such as the introduction of more advanced technology or of new products. Hence any concept of a ring fence to protect the Scottish economy would be wholly inappropriate'.

Since the 1982/3 takeover, Anderson Strathclyde has retained its autonomy within Charter, although it has rationalised capacity with redundancies at its Scottish plants (see concluding chapter).

Even in a region like the West Midlands where most of the primary BC suppliers are absent the West Midlands Enterprise Board found that,

'the existence of strong inter- and intra-sectoral linkages means that well over 100 West Midlands companies have a direct involvement in the mining equipment industry. For many of these, mining equipment constitutes the sole or the dominant activity' (WMEB, 1987).

The WMEB suggested that the fact that BC is or is planning to invest millions of pounds in the region on projects such as the extension of Lea Hall Colliery in Staffordshire; increasing production at Daw Mill Colliery; and the proposed development of Hawkhurst Moor Colliery, will benefit local firms. One of BC's counter-arguments against vigorous local opposition to the Hawkhurst Moor development is that half of the £400 odd million total investment in the project would be spent locally, split equally between tenders to local firms and direct wages to local employees (WMEB, 1987, para. 4.13). During the construction phase the project would generate substantial local employment. Most engineering contracts would probably go to established BC suppliers, many of whom are located outside the region.

Conversely, local disinvestment due to plant closures has significant economic and social costs for local communities. The recent public arguments between the South of Scotland Electricity Board (SSEB) and British Coal over coal prices, provokes concern not only because any decision by the SSEB to import coal threatens the life of the remaining Scottish pits but threatens local mining related industries and services.

In practice, even though there may be concentrations of mining engineering activity in Scotland, or around other coalfields, there is a weak correlation between colliery closures in a particular locality and any restructuring in engineering industry in the same locality. The main reason for this is the relatively low level of decentralised purchasing by British Coal. Most large purchases of plant and equipment, and all plant pool requirements, are dealt with by BC's national Purchasing and Stores Department (P&S). Areas probably account for no more than 15 per cent of total BC purchases.

Even though the correlation between local mining and mining engineering employment is weak it does not mean that a correlation does not exist. BC Area headquarters do have independent contacts with local suppliers, particularly for "irregularly used non-stock items" and "one-off" orders. Whilst national purchasing and tendering policies influence who and where major contracts are awarded, the closing down of large numbers of collieries in the so-called "peripheral coalfields" may have had adverse effects on a range of local engineering firms, such as:

- (1) firms supplying non-stock and one off items of equipment for the local area and collieries; special tools suppliers;
- (2) small plant hire firms, and small-scale engineering activities, such as local plumbing firms, electricians, local firms doing occasional machining work.

In the 1983 MMC report on the NCB, it was recognised

'that there may be cases where the advantages of larger scale purchasing are slight and where local purchasing may help to preserve the distribution of industrial activity' (MMC, 1984, para. 16.19) (author's emphasis).

In reality the preservation of local industrial activity has never been a serious concern of the Coal Board, and it has deliberately concentrated production on fewer coalfields, areas, and pits, and it has centralised its purchasing procedures. At least as far as the majority of mining machinery suppliers are concerned, it is not the geography of British Coal restructuring that is of concern, but its rapidity, scale, and depth. As pointed out earlier, the level of British Coal total output and consequent demand for equipment is at a very critical level. Further colliery closures, wherever they are, may lead to a substantial decline in BC business for several companies.

In order to work out the likely impact of a loss of coal industry orders on particular companies it is useful to estimate the number of jobs and level of turnover dependent on BC. This is fraught with difficulty, and it is unwise to apply assumptions covering the whole range of product markets and suppliers (6). Most ABMEC members are diversified engineering groups spanning several industrial product markets. Nevertheless, their mining machinery subsidiaries are run as virtually autonomous companies, and for most, British Coal represents the major market for their products. Even though most of ABMEC's members export between 20 to 60 per cent of their total output, exports in the highly competitive world markets for deep mine equipment can not compensate for further reductions in home demand (see Chapter Seven).

A postal survey conducted by the author in 1987 (7) found that of 60 primary suppliers to British Coal over a third of them (22 firms) were over 50 per cent dependent on sales to the home coal industry. In an attempt to gauge the likely "knock on" effects of coal industry restructuring on suppliers and on particular localities further research was carried out in two main areas of mining engineering activity (see Table 6:5) - South and West Yorkshire, and the north-east of England. Details are given below in Part Two.

PART TWO

6.6 Mining Engineering Linkage in Yorkshire

The Yorkshire and Humberside region was hard hit by the economic recessionⁱⁿ the early 1980s, and in the longer term by the restructuring activities of large public sector employers - British Steel, British Coal, and British Rail. "Official" unemployment trebled from around five per cent in 1978 to 15 per cent in 1986. The three major nationalised industry employers in the region provide work for numerous local suppliers, sub-contractors, and services, and jobs for thousands of people, especially males. Redundancies and closures in the state sector have had grave consequences for the local engineering industry. Between June 1979 and June 1986 the region lost around 266,000 jobs; the majority were in the state owned industries and manufacturing (EITB, July 1986). To put the decline in local mining machinery employment in broader perspective, Figures 6:9 and 6:10 give the 1978-84 engineering jobs "by country" and by "sector group" trends. Table 6:9 shows the "official" unemployment figures in the main travel-to-work-areas (TTWAs) in South Yorkshire in January 1987. This requires little comment except that the unemployment rates for each TTWA were among the highest in the country.

The coal industry is still an important local employer in Yorkshire, and the county has been a major centre for new British Coal investment, particularly the Kellingley Colliery complex and the Selby "super pit" complex. In total the North Yorkshire Area of BC alone has cost over £2 billion net investment since 1974 (see The Colliery Guardian, June 1987). There are also eight coal fired power stations

within and immediately adjacent to the south and west of the county, including Drax, Ferrybridge, and Eggborough. Nevertheless, parts of the region have been areas of BC disinvestment. A study by O'Donnell in 1988 for the Wakefield Metropolitan District tried to assess the impact of job losses in coal mining and related employment within the locality. 11 out of 17 collieries operating in the district had closed since 1984, and the mining workforce was reduced from 11,000 to 6,054 people. Even the most capital intensive pits are not safe from closure as witnessed by the decision to close the Woolley-Redbrook complex employing 1,300 people in the Barnsley area. BC had built a £46 million coal preparation plant adjacent to the complex and had invested some £30 million into Redbrook alone (Yorkshire Post, 21-11-87).

Table 6:10 shows employment change in the mining machinery industry within the region between 1978 and 1987. In fact there are many more engineering suppliers to British Coal than are included in the table. A postal survey of 26 coal industry suppliers in the region, including eight included in the national survey (see above) found the following:

- (1) Half the companies were over 50 per cent dependent on coal industry contracts. Taken together these companies account for nearly 3,000 jobs.
- (2) There are strong inter-regional linkages between primary suppliers and secondary suppliers of components and sub-assemblies to the mining machinery firms. All primary producers had supplied equipment to collieries in BC Areas outside the region, and secondary suppliers also supplied firms in other areas (see Table 6:11 for details).

Probably less than half of these firms are included in the EITB statistics (Table 6:10). O'Donnell (1988) conducted a similar survey in the Wakefield district, which included seven firms not included in the author's survey. Both surveys found a great variation in levels of dependency on British Coal between firms and over time due to fluctuations in BC contracts. 16 firms in the author's survey recorded a loss in British Coal related business since the 1984/5 miners' strike. O'Donnell's survey found that seven firms recorded a decline in business, only one showed an increase in business with BC, and the rest recorded no change (see Table 6:12).

Two of the largest employers in both surveys were British Jeffrey Diamond (BJD) and Fletcher Sutcliffe Wild (FSW). Both companies are located in Wakefield and are major sources of engineering apprenticeships in the town. Both have lost some business with BC since 1986 and have had redundancies, including 90 announced at BJD in April 1988. Both firms subcontract work out within and outside the region. A number of their sub-contractors are listed in Table 6.11. But it is likely that as British Coal business contracts these firms will increase the amount of "in house" work to protect jobs. In the event of increased orders from BC or as a result of export orders, so that each company can then resume sub-contracting without having to take on extra employees. The largest BC supplier in O'Donnell's survey was sub-contracting some 75,000 hours^{of work}, representing 15 per cent of its factory's capacity in 1987. In 1988 this is expected to be reduced by two thirds to 25,000 hours. A number of major BC suppliers in the region have adopted similar policies in order to maintain a "core" engineering workforce during times of slack demand (Day, interview,

1986; Croft, interview, 1986). But as one local AEU District Secretary put it,

'The "golden egg" that was the National Coal Board has cracked, and local firms are having to diversify into other lines of work or face redundancies.'

In Wakefield MD itself, O'Donnell (1988:20) noted that mining machinery, classified under mechanical engineering (Standard Industrial Classification, 1980), ranked third in employment terms within manufacturing.

'By 1984, however, employment had declined by 21% placing this sector alongside coal mining in terms of the severity of job loss.'

The loss of 232 jobs, as a direct result of the loss of sales to British Coal since 1986, represents seven per cent of mechanical engineering jobs in 1984. As O'Donnell (1988:22) points out, the actual job loss is probably higher due to several small and medium sized engineering firms not covered in that survey. It should be added that the author's survey also greatly underestimates the total level of BC related engineering within the region due to the number of ABMEC members with plants in the region but not included in the survey (see Table 6:13).

An example of a company that has carried out both contract work for BC and BC's major suppliers is Wultex Machine Company, which originally started life as a textile machinery manufacturer, then became a general engineering contractor. During the "boom years" of

high NCB spending in the 1950s Wultex became increasingly dependent on basic fabrication work for the Coal Board and other mining machinery firms, including FSW, BJD, and suppliers further afield, such as Dowty Meco (Worcester), Dowty Hucknall (Notts.), and Gullick Dobson (Wigan). Any reductions in subcontracting would obviously adversely affect a company such as Wultex. Nevertheless, in recent years the company has developed a manufacturing capacity to make a complete range of conveyor systems for underground and surface applications, as well as other longwall equipment. These changes have taken place partly as the result of the company being sold by its distant parent Hampton Gold (Australia) to Becorit of Ilkeston, another supplier of underground equipment to BC.

All the large towns in south and west Yorkshire have at least one engineering supplier to BC (see Table 6:11). The largest, Sheffield, is the headquarters of NEI's mining equipment division, Burnett and Hallamshire's mining division (opencast contracting), and Eickhoff, the West German coal shearer manufacturer's UK selling agency. In 1981, Anderson Strathclyde, the Scottish-based shearer maker, set up a coalface machinery manufacturing facility in the City. A company statement stressed Sheffield's important location "virtually at the centre of the British coalfields", which was ideal to improve Anderson's "facility to provide a quick response to the needs of the mining industry". In addition to the larger firms there are several general engineering and metal-bashing companies who have done fabrication and machinery work for the coal mining industry from time to time.

Barnsley, like Wakefield, lies in an area of much coal-mining activity. In 1984, the Barnsley Metropolitan Borough Council conducted a local survey. They were provided with a list of 34 firms in the Barnsley area which had supplied the Coal Board in 1982/3. Individual companies were approached to assess the likely multiplier effects on employment in other industries of a further coal mining contraction in the locality. The study demonstrated that around 1,200 jobs in these firms were NCB-dependent. In other words, nearly 12 per cent of all jobs in the local metal using industries were directly coal related (Barnsley MBC, 1984).

In addition to concentrations of mining engineering activity, especially in the towns of south and west Yorkshire, there is a close relationship between state owned industries and manufacturing in the region as a whole. The links are many and varied. Mining machinery firms purchase special metals and components from Sheffield steel based concerns. British Rail's engineering workshops (pre-privatisation) in Doncaster carried out sub-contract work for the Coal Board. BR transport coal produced in the region. Many employees in private firms started out as apprentices in the state-owned industries. And as illustrated by the coal industry, there are complex supply networks between monopoly buyer and suppliers .

A further illustration of the impact of British Coal's purchasing power on the level of manufacturing activity is reflected by recent demands from both Conservative and Labour MPs for the government to step in to prevent BC from buying some of its cloth requirements from overseas sources. Previously BC has used 100 per cent British-made cloth to make donkey jackets and duffle coats for its workforce, but

early in 1988 it asked textile manufacturers to look abroad for cheaper alternatives to British heavy-duty cloth (Yorkshire Post, 30-03-88).

Interlinkages between and within public and private sector industries form an intricate web, once some of the main threads are cut the whole web is destroyed. Such linkages exist at all levels of the national economy, but they are particularly important in areas dependent for employment on nationalised industries and a few dominant private sector enterprises. Many of the smaller businesses and service industries either supply goods and services to the dominant industries, or rely on the local purchasing power of employees in those industries and their families to buy goods and services.

6.7 Mining Engineering Linkages in the North East of England

It is not the purpose here to reiterate details concerning the deindustrialisation of the north east of England (see Hudson & Sadler, 1986). The area as a whole has been very dependent on large public and private sector employers in coal, steel, shipbuilding, the railways, chemicals and the offshore supply industries. The aim of this section is to focus on the local significance of coal related engineering linkages and upon the knock on effects that restructuring within the coal industry has had upon linked industries and jobs.

At the start of the 1984/5 coal dispute, the Coal Board was the largest employer in the North East, employing about 22,000 people. An internal NCB report leaked to the NUM revealed that the NCB planned to reduce employment to 16,500 people by 1987/8 and to around 10,000 in a

decade (Trade Union Studies Information Unit, TUSIU, 1985:51). In fact, the ten year target was almost reached in only three years. In 1987/8, British Coal employed 11,800 underground and surface colliery workers in the area. The cut in coal industry employment by almost half since the end of the miners' strike has had repercussions well beyond the industry and the mining communities. A TUSIU (1985) study suggested that for every 100 mining jobs lost, another 52-82 jobs in other sectors would be lost in the north east. Whilst it is almost impossible to estimate with any accuracy the total number of jobs lost as a direct result of BC pit closures within the region, it is useful to examine the multiplier effects on local engineering suppliers of the national run-down in deep coal mining activity in the 1980s.

Hitherto, the only detailed study of coal mining multiplier effects in the North East was by Hudson, Peck and Sadler (1984), who examined these in the Easington District of County Durham. One of their conclusions was that "income" effects are more pronounced than "linkage" effects at district level, although much obviously depends on local industrial structure. As was recognised by its authors, the Easington Study was restricted by its narrow geographical focus. British Coal's purchasing policies and area plant requirements are organised at national level, which means that local suppliers are more likely to be affected by national than by local investment and disinvestment decisions, even though the former is obviously an influence upon the latter. As pointed out in section 6.5, areas do purchase "non stock" and "one off" items, and they do have lists of local suppliers. This study has, however, been faced with a problem met by the authors of Undermining Easington, that is BC's unwillingness to provide even basic data relating to engineering contracts awarded to

local engineering companies. This means that no estimates can be made relating to the amount of North East area plant and equipment needs that have been met by north east-based suppliers. Much of the following is based on the author's research interviews, company visits and media reports.

Mining related employment in the North East is more than that recorded in statistics covering "the mining machinery industry" for the Northern Region as a whole (see Table 6:14). There are several primary suppliers to British Coal in the north east area. In addition, there are numerous small plant hire firms that do some contract work for local collieries from time to time (Table 6:15). Research interviews found that four of BC's north eastern suppliers do sub-contract work to other engineering firms within and outside the North East. Coal mining linkages with engineering suppliers in the region fall into two main categories. These are:

- (1) Companies supplying capital goods direct to British Coal and their own suppliers.
- (2) Jobs dependent on orders for new coal-fired power stations from the electricity supply industry (ESI).

The inclusion of the second category here is owing to the dominance of Northern Engineering Industries (NEI) and its various local subsidiaries as a private sector manufacturing employer in Tyneside. NEI's main business, accounting for some three-quarters of its total turnover in 1985, is as a supplier of power plant for the electricity generating industry at home and abroad. Employment in NEI is related

to the contraction in deep coal mining activity only as much as this is related to and has been influenced by the ordering programmes of the state owned electricity boards for new coal-fired power stations.

To simplify matters, the first set of linkages are considered first. Nevertheless, it is useful to understand the connections between the home ordering programme for power plant, the demand for British produced coal and the demand for mining machinery. It is true that the ESI exerts an enormous influence on the coal industry, and in turn, on equipment suppliers. Dewhirst and Gladstone (1988:21) tried to estimate how many jobs in the longwall mining equipment industry depend on BC's sales of coal to the ESI. They estimated that the coal industry's dependency on the ESI is about 73 per cent

'and therefore that is the proportion of coal-industry-related jobs which is properly attributable to the electricity supply industry.'

The attempt here is not to quantify the number of mining machinery jobs in local suppliers reliant on the ESI via coal orders to BC. What follows is a qualitative description of existing engineering linkages with the coal chain, and some details relating to reported job losses in north eastern mining equipment suppliers. This understanding of coal related engineering linkages has important public policy implications (refer to the concluding section).

Primary mining equipment suppliers to British Coal are well represented in the region (see Table 6:15). In addition, there are numerous small plant hire firms that have done some business with BC at area level. Research on the primary manufacturers found that four of

them have sub-contracted work out to and/or bought supplies from other engineering firms located in the north east, although without precise figures the total level of local subcontracting can not be gauged.

Some idea of employment change in the mining machinery industry of the Northern Region is given by the EITB returns (see Table 6:14). As in all other UK regions, employment in the industry declined. More specific employment data based on the author's research is given in Table 6:16. In no single case has there been an increase in employment during the last six years, except for periods when big orders have necessitated re-employing former employees or taking on new recruits for short periods, often less than one year. There is a strong correlation between reduced British Coal demand and job losses in these mining suppliers. In order to examine the knock on effects of BC's purchasing policies on north eastern suppliers, two companies operating in very different product markets were chosen for closer study.

Huwood Limited

Huwood Limited is a member company of FKI Babcock (formerly Babcock International). At its Gateshead factory Huwoods makes conveyors and bulk handling equipment primarily for the underground coal industry. The company was over 80 per cent dependent in terms of total sales turnover on the home coal industry in 1979. The downturn in British Coal demand in 1980/1 led Huwoods to start diversification measures. These have been in two forms. Firstly, Huwoods sought to raise exports of its existing product range. Secondly, it sought to extend its range of products away from the types, designs and specifications suited only for the domestic market.

To a limited extent Huwoods succeeded in lessening its reliance on BC. Between 1979 and January 1986 Huwoods had reduced its sales dependence on the Coal Board by ten per cent. The aim since the miners' strike has been to reduce total dependency to less than 40 per cent (Lowery and Moore, interview, 1986). To do this the company has had to increase exports. This has meant producing technology to service both deep mining and the opencast industry. As with other suppliers of underground equipment to British Coal, Huwoods has virtually had to develop a new range of equipment specifically for the export market. The markets for longwall equipment overseas are fiercely competitive and more limited than for surface mining machinery. Furthermore, the Coal Board's tight specifications are often not required by overseas customers.

In 1982, Huwood won a £500,000 contract to supply conveyors to the Indian State coal company as part of a British mining technology package worth £65 million to develop the Amlori open pit complex. The following year it won big orders for conveyors from Canada. In 1985 Huwood representatives were part of a Newcastle City Council delegation to Taiyuan in the Shanxi Province of China in an effort to win equipment orders. That year it won its largest single export order worth £2.5 million to supply 14 belt conveyor system to transport 1.5 million tonnes of lignite a year at Beypazari's mine complex in Turkey (Newcastle Journal, 20-03-85). The company is also part of a development programme attempting to find technical solutions to the problems of Chile's open pit copper mining industry. Huwood developed a prototype conveyor aimed at transporting ore from the pit bottom to processing units on the surface, which represents a departure from its existing products (Newcastle Journal, 03-02-88:5).

In spite of export successes, the company has found it difficult to compensate for the loss of BC business, and it has made some painful readjustments to a shrinking home market. Before 1979 Huwood and other suppliers were quietly confident of increasing orders from the Coal Board in the 1980s. But by mid-1980 the company made 230 people redundant owing to a ten per cent drop in orders from the NCB. In 1981 it introduced a three day week for two months to prevent further job losses, and Huwood's management blamed the Coal Board for the company's "disastrous position" (Newcastle Journal, 30-01-81:9). To up-date its facilities Huwood embarked on an internal production reorganisation programme, which included £2 million investment in computer-aided design and manufacturing facilities. As the company's Operations Director put it,

'For too long Huwood has been dealing in the same products with the same customers and in the same old ways. If the business alters you need to be up amongst the changes' (Lowery and Moore, interview, 1986).

Unfortunately for its employees Huwood's business reorganisation has not prevented the loss of 1,130 jobs between June 1978 and June 1988 (see Table 6:16).

Victor Products

Victor products, with its main plant at Wallsend, has a different company structure and market profile to Huwood, which made it less dependent on the home coal industry market. It was founded in 1929 on the success of an electric drill designed by Reg Mann. The company remained independent of control by a larger group until 1988 (see

below). Victor was a supplier of drills and lighting equipment to the NCB. In the 1950s the company became 60-70 per cent reliant on the Coal Board in terms of sales turnover. Even in those days the Victor board were worried about the dominance of one monopoly buyer.

Victor's period of rapid business expansion came in the 1970s. It grew by acquisition between 1973 and 1979. In 1973 Victor bought Transtar, which manufactured control gear for lighting equipment. Two years later it added a lighting division to its operations (see Figure 6:11). And in 1978 the company embarked on a three-year expansion programme including the building of a new factory, which was partly funded by a £500,000 loan from the European Coal and Steel Community (Evening Chronicle, 27-12-78:9). During this period the company sought new markets, especially in the North Sea offshore industry and petrochemicals industry for its lighting products. It succeeded in increasing sales from £2 million in 1973 to £10 million in 1979. Nevertheless, the UK coal industry still accounted for almost 60 per cent of Victor's total sales.

At the start of the 1980s, Victor's management were in a confident mood. The company's Managing Director, Roy Mann (of the founding family), expressed the feelings of several NCB suppliers at that time.

'I think there has been a tendency to exclaim "Woe is me. Coal is dying, where can we go?" Then we saw that instead of being a dying industry, it was a changing industry' (The Sunday Times, 09-03-80:59).

One year later, the Victor board had already decided that the industry was changing too rapidly for the company's liking and that they had to

diversity further or die. During the year Victor introduced spells of short-time working at its Wallsend and North Shields plants. Management blamed the general economic slump and cuts in NCB orders.

Like so many other British mining suppliers Victor benefitted from an increasing interest in world coal producing markets in longwall mining technology. This led to increased exports to the USA, Australia, China, and South Africa, where Victor already had a subsidiary company. In 1978, exports had accounted for 14 per cent of total sales, but by 1983 exports were 20 per cent of total sales. In that year its South African subsidiary bought a small manufacturing facility in Johannesburg. Nevertheless, the company was badly affected by the sharp drop in Coal Board orders during the miners' strike of 1984/5. During that year Victor lost £3-£4 million of orders, announced 40-50 redundancies, and placed 100 more people on a four day week (Hudson, et.al., 1984:102). Even before the strike Victor had suffered a decline in NCB related business. The financial year to April 1984 had moved the company from profits to pre-tax losses of £670,000. Its workforce at the start of the miners' strike was 740 people, with 660 of those employed on Tyneside.

Just before and during the miners' strike period the Victor board had been planning an ambitious business reorganisation to lessen its dependence on the NCB market. In 1984, Victor merged its connector and hydraulics facilities onto one site to form a hydraulics division. This was essentially a rationalisation exercise, which involved reduced company overheads and some redundancies. Victor also sought to become more involved in the offshore oil and gas markets by buying two Hartlepool based companies - the VAS company (Victor Automation Systems

Limited) supplying microprocessor "watchdog" systems to oil platforms, and Kracht Hydraulics, designers of control systems for the offshore, marine and water industries (see Figure 6:11).

In the middle of the 1984/5 financial year, Victor's new managing director, Christopher Fitzpatrick, announced the company's aims:

- (1) To seek every means to reduce costs without damaging the company's structure.
- (2) To widen the product base of its mining division so as to maintain its long-term turnover in a shrinking market.
- (3) To increase business in areas outside the UK coal mining industry (Fitzpatrick, interview, 1986).

Flexible manufacturing in Victor's mining division, Wallsend

The Victor board decided to use the miners' strike period to introduce major production facility changes into its mining division. At the time Victor had a total business turnover of £20 million, and its mining division had a £7 million turnover, which did not represent sales to the NCB from other Victor divisions. The board decided to invest £900,000 on new technology at Wallsend, which represented a big capital outlay at a relatively small plant. The decision to invest in a flexible manufacturing system (FMS) cell at the site was partially encouraged by the availability of a Regional Development Grant (RDG). According to Fitzpatrick (interview, 1986) the RDG "swung the balance in the board-room in favour of the most advanced technology available." (8) The scale of the capital expenditure relative to the division's turnover represented "an act of faith" in the Coal Board.

New investment would enable the company to become a more flexible supplier and a more competitive one better placed to win NCB orders after the strike (Fitzpatrick, 1986).

The home market was not the Victor board's only concern. As Andrew Murison, Director and General Manager of Victor Mining, put it,

'The most telling point was international competitiveness. We said that the NCB was our main customer, but their demand looked as if it would decline over the years. Our markets were overseas. If we did not have the very best in equipment we would be at a serious competitive disadvantage in world markets' (Murison, 1986).

From the management's perspective, the advantages of FMS technology were in terms of cost cutting and increasing the division's speed of response to customer orders. In common with other NCB suppliers, Victor was aware of the Coal Board's increasing emphasis on "lowest cost" criteria and on faster delivery times. The decision to invest was to some extent "forced" upon the company due to NCB restructuring and by the fact that Victor's existing plant was very out-dated. As Murison (1986) put it, the division's lathes "would soon be falling to bits". Nevertheless, the company still had alternative investment options and it could have opted for new computer numerically controlled (CNC) machines rather than an FMS cell. Murison (1986) argued that FMS offered the most "flexible" option for machining a range of small prismatic components used in all the company's mining products.

"Flexibility" was defined in a number of ways. Firstly, Victor identified the need for products to be brought to markets more quickly, and for greater product variety and shorter manufacturing runs. FMS

reduced the lead times for castings requiring up to ten separate machining operations. This meant quicker batches and more reliable production scheduling. Secondly, capital productivity was increased. Total machining time was a maximum of 60 per cent less than for conventional lathes and around 20-30 per cent less than stand alone CNC machines. The FMS cell also enabled the introduction of a third shift and 24 hour production without increasing labour costs (see below). Thirdly, inventory costs (i.e. costs of storage space and handling) were reduced by up to 25 per cent per annum, which was a saving of around £32,500 a year at 1984/5 prices. Increased machining speed enabled the company to match its components production with customer orders as they arrived, which meant fewer stocks were needed.

Finally, the management wanted to reduce labour costs. Mursion (1986) argued that "labour productivity would not grow fast enough to stabilise costs". The FMS cell offered the advantage to management of cutting three to four production workers off the annual wages bill, which was a reduction of approximately £32,000 at 1984/5 prices. Further redundancies in other jobs - stores, inspection and maintenance (with the introduction of computerised diagnostics) - meant 11 jobs shed in total. Whilst this represented about 15 per cent of total jobs lost at Victor Products during the miners' strike, the FMS cell was part of a longer term strategy for greater automation of both manufacturing and design.

'If at all practicable unmanned operation would be a significant advantage to enable 'between shift' coverage to be undertaken' (Mursion, 1986).

The large capital investment was designed to streamline operations to increase profits by raising capital productivity in the long run, and reducing inventory and labour costs. The installed elements of the FMS cell included 130 cutting tools and a host computer to monitor their sharpness and to manage the production programme with continuous monitoring facilities. In July 1986, Industry Minister, Peter Morrison, officially opened the FMS cell, and he praised the company's "bold decision" to go ahead with the work during the miners' strike when the division's order books were severely cut (The Mining Engineer, July 1986).

In the 1985/6 financial year, Victor Products made pre-tax profits of £1.4 million on a total turnover of £20 million, and its lighting and drilling equipment sales to the coal industry were up 40 per cent on the previous year to £9.58 million. The executive chairman, Roy Mann, confidently argued that,

'We are now talking about consolidating the existing workforce position rather than taking more on. We hope the business will grow, but the emphasis would have to be on more automation' (Newcastle Journal, 27-02-86:9).

In fact, rather than consolidating employment at Victor, the period after the strike was marked by a series of redundancies, which reduced employment from 750 people in April 1985 to fewer than 500, including around 400 employees in Tyneside, by January 1988 (Evening Chronicle, 07-01-88:1). During 1986/7, the company closed its hydraulics division and shed 130 jobs. The North Shields lighting division was moved to Wallsend at a cost of £ one million (refer to Figure 6:11).

Rationalisation in the North East's mining equipment industry is not confined to Huwood and Victor Mining. All the companies supplying the coal industry have cut employment (see Table 6:16). Only one company has actually increased its business with British Coal since the miners' strike. This is EIMCO, the UK subsidiary of the US-owned Baker International group (formerly EIMCO was owned by the Envirotech Corporation of Salt Lake City). EIMCO has won business because it is one of BC's primary suppliers of free-steer vehicles (FSVs), and it also supplies roadway tunnelling machines. Both items have been much in demand by BC as it has sought to increase productivity. FSVs have been introduced into numerous British mines, which are utilizing more tracklers haulage techniques similar to those used in many US mines by private operators. BC's increasing use of "retreat" mining methods also requires more roadheaders for faster roadway development. In contrast, most of the other local suppliers have provided the same fundamental reason for job losses, i.e. "entirely due to the decline in business received from British Coal" (postal survey, June, 1987).

NEI - Power plant supply

In January 1988, Victor Products was taken over by NEI, and it became a part of NEI's mining division based at Sheffield. The take over marked a significant concentration of manufacturing employment in the north east of England within one large corporation. Several NEI plants and its global headquarters are based in the area (see Figure 6:12). The local employment contribution of NEI should not be underestimated in an area like Tyneside which has higher than national average unemployment and had a male unemployment rate of over 20 per cent in 1987 and 1988. The concentration of private sector

manufacturing employment in NEI has given the corporation a pivotal role in the region's economic development. As a report by the local District Councils and NEI trade unions on Tyneside (1986:30) put it,

'NEI's role within the Tyne and Wear sub-region means that the retention and re-establishment of jobs in the company is an important element of any strategy which seeks to redress or reduce the growing imbalance between the levels of unemployment and prosperity between different parts of the country'.

NEI's primary business is in supplying equipment to the electricity supply industry (ESI). The corporation was formed in 1977 by the merger of Reyrolle-Parsons and Clarke Chapman, two large Tyneside companies, and a group of other suppliers, including John Thompson, Cochran, and International Combustion Limited (ICL). The historical background to these mergers has much to do with the dominance of the state-owned electricity boards, especially the Central Electricity Generating Board (CEGB) in the home market, and the highly uneven home ordering programme for new power stations.

The commercial pressures to rationalise the structure of the UK's power plant supply industry had built up during the 1970s, which was a decade of very limited power station capital expenditure. In contrast, the 1960s represented a boom period for power plant manufacturers as the Advanced Gas-cooled Reactor (AGR) nuclear power programme was launched and new large fossil-fuel power stations were ordered. In fact, until 1988 the last major order for a coal-fired power station was Drax in Yorkshire. In March 1966 the first stage of the project ultimately to construct six 660 Mega Watt (MW) units and six 35 MW gas turbines was started. The capacity constructed during the 1960s and

early 1970s was in anticipation of a demand for electricity which, due to the depression of 1979 onwards and the changing nature of energy requirements, did not materialise. As a result the capital programme declined during the 'seventies, and there were no new orders for coal-fired plant after the second phase of Drax 'B' had begun in 1977. Consequently the power plant industry was suffering from excess capacity.

The formation of NEI was encouraged by the government and the CEGB as a way of cutting capacity and forming an integrated home manufacturer of power plant. It left three dominant sources of the four main items of power plant - boilers, switchgear, controls and turbine generators. These were:

- (1) The General Electric Company (GEC) for generators, gas turbines and switchgear.
- (2) Babcock International (now FKI Babcock) for boilers, and switchgear.
- (3) NEI for boilers, generators, controls and switchgear.

This meant that the manufacture, development and control of technology for UK power stations had passed to three large corporations operating on an increasingly international scale. The fact that the placement of orders for new power stations is currently a matter for the big state owned electricity boards and the UK government has given the public sector an enormous influence on the profitability and production of the home power plant industry. In turn, the scale and distribution of new power plant contracts, which can amount to billions of £s for each new power station, have big economic and social implications for the

localities where the production plants of the major suppliers are sited. Furthermore, the fact that the CEGB and the South of Scotland Electricity Board (SSEB) have had a technical preference for large power stations has intensified competition between the big three suppliers. This was recognised by the Tyne and Wear (1986:9) study,

'Rather than a steady succession of small orders the industry is dependent upon "once and for all" orders for major power stations, creating a dramatic situation of boom or bust'.

"Boom or bust" has deep meaning for the workers who are employed in NEI's Tyneside factories. It means retaining local engineering skills or losing them, and in an area of high unemployment it literally can mean economic independence with a job or benefit dependence without one. Whilst NEI Reyrolle at Hebburn and NEI Electronics at Gateshead are heavily reliant on new orders from the home electricity supply industry, they do have diverse markets for their products. This is not so of NEI Parsons, based at Heaton, which is primarily a producer of turbine generators for power stations. It is Parsons that has been most adversely affected by the uneven home ordering programme for power plant, which is reflected by orders for turbines (see Figure 6:13). The only orders for turbine generators for Parsons in recent years in the UK were for Drax 'B' in 1977, and for two new AGRs at Heysham and Torness in 1978. In fact, the Drax 'B' orders were deliberately brought forward by 18 months earlier than intended partly as a result of political concern over employment in the power plant industry of the North East. Since 1978 NEI Parsons has had no new home orders for turbine generators, although it has carried out repair and maintenance work for the CEGB (Figure 6:14 gives details of the CEGB's power stations capacity).

The long periods without any new home orders at all has created considerable pressures for the big three suppliers. Part of the reason for such long delays is the great political, financial and commercial importance of the power plant decisions. It is an issue that is at the heart of debates about the UK's energy future. It has produced deep divisions with the UK's nuclear lobby between supporters of the British designed AGR programme and advocates of the US designed Pressurized Water Reactors (PWRs), as well as between coal and nuclear lobbyists. It has produced deep Parliamentary divisions between and within the major political parties, and within the broad labour movement, particularly between unions with workers in different energy industries. The issue is further complicated by the problems associated with forecasting future energy requirements based largely on assumptions about economic growth. In addition there are the very real concerns about the safety and environmental hazards of nuclear power and conventional coal-fired electricity generation (i.e. acid rain pollution) (see concluding chapter).

Sweet (1985:203) summed up the critical nature of power industry politics thus,

'If one wonders why the struggle over the future of the electricity supply industry engages the immense resources that (were) being disposed of in the miners' dispute (or the lesser, but very costly side-shows like the Sizewell Public Inquiry on Nuclear Power), one has only to look down the list of interested parties and estimate what is at stake. Power yes, energy power, political power, but also money - many thousands of millions of pounds are at stake for the Energy Establishment. The risks, both political and economic, may sometimes threaten to get out of hand, but the potential gains are great enough to make not only the risks justifiable, but the thought of not winning impossible to contemplate.'

The powerful commercial vested interests have a lot to lose and gain. They are able to use their influence within the Energy Establishment and apply political pressure on the government to bend their way. The main commercial beneficiary of the Government's and CEGB's preference for a PWR nuclear policy has been GEC led by Lord Prior, former Conservative Cabinet Minister. GEC Turbines, Parsons' only UK rival, won the PWR turbine orders for Sizewell 'B'. This marked the culmination of nearly two decades of behind the scenes political lobbying which started in the late 1960s when GEC emerged as the dominant UK power plant supplier. It acquired English Electric along with its licence to build the Westinhouse PWR in Britain (see Hall, 1986).

As a prominent member of the AGR camp, NEI had invested millions of pounds into the British nuclear programme. The corporation was badly affected by the approval of Sizewell PWR in 1986. For example, NEI had invested in its boiler-making capacity at its Power Engineering factory in Gateshead. In 1982, the factory's name was changed to NEI Nuclear Systems Limited (NSL) in anticipation of new AGR orders. Some £2 million of regional aid was invested in transforming the plant into "the most modern and highly automated plant in the North East" (TUSIU/NSL Gateshead Joint Shop Steward's Committee, 1986:2). The Sizewell decision meant that NSL's orders dried up except for some work for British Nuclear Fuels Limited (BNFL). The corporation decided to concentrate work for coal-fired boilers at its International Combustion Limited (ICL) factory in Derby and scale down operations at NSL. The boiler contracts for Sizewell went to Babcock's Renfrew factory in Strathclyde.

The absence of home orders for one decade has meant a decline in the workforce of the UK power plant industry from 56,000 in 1978 to 42,500 people in 1985/6, some 22,500 of whom are employed by the dominant three firms. The most severely hit plants were NEI's Tyneside facilities (see Table 6:17) and Babcock Energy's Renfrew boiler-making plant. NEI alone shed over 12,000 jobs between 1978 and 1984. The majority of jobs lost were in Tyneside where NEI employment fell from 16,000 people in 1977 to about 7,000 people by December 1986. In that year the corporation announced a £75 million rationalisation programme, which reduced its manufacturing operations world wide to just 24, and shed about 4,000 jobs, which left its global workforce at approximately 20,000 people (FT, 25-01-88 : 'Electricity Industry Survey').

NEI Parsons employs some 3,000 workers (June 1988), and it is the largest single manufacturing employer on Tyneside. It was established in Newcastle in the 1880s and it has been a leading international supplier of turbine generators. Nevertheless, during the 'eighties the plant has been "grossly underloaded" (Ibid). Parsons has had to win export orders merely to survive in the business and maintain a core of highly skilled engineering workers at the plant occupied (Lawrence, interview, 1988). In spite of a succession of overseas orders, including a £25 million contract in 1988 to supply the Hong Kong Electric Company with a 350 MW generator for an extension to the Lamma Island power station, Parsons has been unable to maintain employment levels. It shed 600 jobs in 1986 and a further 800 jobs in 1987. Although the Hong Kong order will keep part of the factory busy until 1990 Parsons is still working well below full capacity, its only home orders of significance have come from BNFL for nuclear fuel flasks, and the plant has tried to diversify into other markets. In 1987/8,

Parsons succeeded in winning a contract to supply car body presses to Komatsu.

The NEI group has invested over £90 million during the last decade on numerical control (NC) and computer numerical control (NC) at Parsons. The main purpose of the expenditure according to Ray Lawrence, Parsons' manufacturing director, was to improve the company's competitive edge against foreign competitors, especially the Japanese.

'New technology was allowing Japan in particular to offer cheaper products. Our survival could be in question so we decided to put a major part of our strategy into an investment programme' (Industrial Computing, February 1986:14).

It represented a carefully defined business strategy, not just a piecemeal addition of new technology, as and when it became available. The aim was to cut down costs using CAD/CAM (computer aided design and manufacture); reduce engineering process and procurement lead times; and rationalise data preparation and handling times and costs.

The massive capital expenditure commitment in Parsons also reflects the corporation's faith in the company winning further home orders. It is realized by the NEI board that Parsons can not go on indefinitely without winning a share of the UK turbine market. When the government announced plans to construct some 13,000 MW of capacity by the year 2000, NEI's management and workers were confident that Parsons would win the turbine orders for two proposed coal-fired power stations at Fawley 'B' on Southampton Water in Hampshire and West Burton in the Midlands. But the CEBG has dropped what Holmes et al (1987) called the "buggins turn" policy of sharing out major contracts

between the British suppliers. GEC Turbines won the £90 million contract to design, supply and manufacture two 900 MW turbine generators for Fawley (although the Fawley decision has since been postponed). Although this order ended a 14 year drought for GEC Turbines, because its last non-nuclear order was for Littlebrook on the Thames in 1974, it already had the Sizewell order to its name.

In addition to its big home orders GEC Turbines has won major contracts overseas, particularly in South Africa and China, to make it "one of the healthiest energy equipment businesses in the UK" (FT, 25-01-88). Its aggressive export drive raised its share of world markets from some 5.1 per cent in 1970-75 to 12.5 per cent between 1981 and early 1988, turning it into the world's number two supplier behind Mitsubishi of Japan (see Table 6:18). The GEC group also claims export earnings per employee second only to those of Jaguar (FT, 04-06-88:5).

The home ordering programme is of critical importance to the spatial pattern of UK manufacturing activity and the future economic development of particular localities. Undoubtedly, the privatisation of the ESI and the liberalisation of European trade in 1992 are going to intensify competition in the power plant industry. Although the building of smaller power stations by private operators will generate more small contracts for the UK suppliers, there is likely to be an increase in imports. The future success of UK companies is going to depend on multinational joint ventures to win overseas contracts, and on their involvement in the various private consortia interests seeking to build and operate private power stations (see Chapter Seven and Chapter Eight).(9)

As pointed out above, there are other crucial considerations related to regional employment within the UK. Current government policy is to leave power plant decisions to market forces (the PWR programme excepted). At the same time, the government has fundamentally influenced the structure and performance of the industry by delaying the ordering of new fossil-fuel powered capacity until after the Sizewell Inquiry. The announcement of new coal-fired power stations before 1987 could have saved 1,400 jobs at Parsons and over 1,000 jobs lost at Babcock's Renfrew plant between December 1986 and October 1987. The Tyne and Wear (1986) report stressed the regional economic significance of power plant decisions, and the close interaction between public policies relating to energy and balanced industrial growth and regional development. They argued that it is imperative for the central government to base important decisions like power station contracts on considerations of broader costs and benefits, particularly on concerns for regional manufacturing employment. As Dewhirst and Gladstone (1988:21) observed,

'In regional employment terms, the North East and Strathclyde have a high level of dependency on (the power plant) sector and hence the future of their local economies is to an important degree dependent on developments in the electricity supply industry. Whilst the West Midlands (base of GEC Turbines) also has significant employment in this sector, it is less dependent and hence less vulnerable.'(10)

The location of new power plant and engineering jobs

The geography of power station locations, as well as the type of fuel and size of station, is a critical factor in the distribution of coal mining jobs, mining equipment and power plant supply industry

jobs. The decision to build Hartlepool AGR power station in the middle of the North East coalfield dealt a major blow to the local mining industry. Most of the area's coal goes to the coal-fired power stations located within the CEEB's north east coast area (see Figure 6:15), and to three coal-fired power stations in the south east of England - West Thurrock, Tilbury and Kingsnorth. The four coal-fired stations in the North East are reaching the end of their projected life span, and only Blyth 'B' is expected to continue operating until year 2000 (TUSIU, 1987:12).

Electricity privatisation leaves the future siting and type of power stations in considerable doubt. The probability of unrestricted coal imports, following the construction of deep water port handling facilities on major river estuaries, threatens the life of all deep mines in the North East. Without central government measures to protect the regional distributions of coal mining activity in the late 1980s - early 1990s, electricity privatisation is likely to produce a free-for-all as private utilities and distribution boards seek to reduce short term costs by importing cheap energy. This would almost certainly lead to more excess capacity for British Coal and an extension of the corporation's "high cost tail" according to short-term market criteria. But as Prior and McCloskey (1988) argue, most BC mines are raising productivity and lowering costs, and if they are protected by deliberate state intervention, they could very well be providing the most economical fuel source by the mid-1990s (see concluding chapter).

The coastal collieries of the North East would certainly benefit from the construction of a local coal-fired power station. The

criteria underlying the new proposals for power stations is related to the future import orientated strategy of the CEEB and to a mixture of economic motives with political ones. Fawley is handily placed to import coal. West Burton is located close to the Nottinghamshire pits where the Union of Democratic Mineworkers (UDM) hold control and is described alternatively as "responsible" or "tame". These sites, plus the probability of greater fuel imports to the SE power stations, cast doubts about the future of deep coal mining in the North East. Even though the North East coalfield, which had an addition to its fixed capital assets of £30 million in 1986/7, far outperformed Nottinghamshire, which had an addition of some £107 million. In terms of performance, the NE coalfield was more cost effective than Nottinghamshire.(11)

In addition to the coal productivity argument, TUSIU (1987) estimated that 13,000 North East jobs are directly related to building coal-fired plant and supplying the primary fuel in two corporations, British Coal and NEI. Any new power station, whether it be nuclear or fossil-fuel based, would require local construction workers. But as TUSIU argue, a coal-fired power station in the North East would provide more local jobs than the proposed PWR at Druridge Bay because there is already a well established local infrastructure and the necessary skill base developed around coal mining. Furthermore, a PWR station would only require 400 permanent power workers, whereas a coal-fired station would need 600-700 workers. They also argued that even more construction and operation jobs could be created by local Combined Heat and Power (CHP) plants (see concluding chapter). New coal-fired capacity would safeguard local railway and other transport jobs connected with coal supply and handling.

As noted throughout this section, engineering linkages with the coal chain are firmly established in the North East. Whilst all the primary BC supplies manufacture goods for all the coalfields, the level of home deep mining production is at a critical level, and if it is allowed to fall much below 80 million tonnes per annum a number of suppliers will be squeezed out of the home market for certain products. This is why the building of coal-fired power stations designed for using British produced coal would help to protect mining machinery suppliers.

The author's research of the North East's BC supply network found that there are strong intra-regional and intra-sectoral linkages between engineering firms. Sub-contracting work out to other firms is a feature of the underground mining machinery industry (see Part One). The fact that virtually all BC's primary suppliers within the North East have lost coal business has almost certainly reduced the local level of sub-contracting. Without precise data it is impossible to know how many firms and jobs are affected by this. NEI Parsons is another company that subcontracts work out. As much as half the total value of turbine generators comes from outside sources, including other NEI subsidiaries, but also local engineering firms providing forgings, castings and other small components (Lawrence, interview, 1988).

Hudson et.al. (1984:101) found that within the Easington District there was evidence that second - and third - round multiplier effects transmitted to local firms. They also suggested that,

'all engineering firms in the area would be affected by the general fall in business resulting from mining decline, as firms compete for business in other parts of the local economy.'

Numerous plant hire contractors and small firms providing "non stock" items to the area's collieries are also likely to lose some business with the closure of North East pits. Whilst the total number of engineering sector jobs related to area-level purchasing is likely to be small, further job losses in this sector would add to others related to the general contraction of the British coal industry.

Only NEI-Victor and Davy McKee (Stockton) Limited of the North East's suppliers to BC have the product range to supply other energy industries, including the offshore industry and the nuclear industry. Companies such as Huwood Limited and EIMCO producing dedicated underground mining machinery items, such as armoured face conveyors, free steer vehicles, roadheaders, and companies like RB Bolton and Holywell producing components specifically for deep coal mining machinery, find it extremely difficult to diversity into other areas of mining, let alone entirely new markets. The various responses of suppliers to the changed home coal market has served to increase the decline of wage labour in engineering within the region, adding to the local burden of unemployment and problems of deindustrialisation.

6.8 Conclusion

An understanding of the intra- and inter-sectoral linkages that exist between and within the coal industry is necessary in order to assess the broader economic, social and political implications of current public policy decisions affecting the energy sector. This chapter has provided empirical evidence to show that current government policies, including the emphasis on short-term financial criteria in

the state sector; British Coal's restructuring programme; the likely importation of cheap coal following the privatisation of the electricity supply industry; and the state-sponsored PWR programme, pose a threat to jobs, not only in the mining industry itself or within the coalfields, but to thousands of manufacturing jobs throughout the country.

Secondly, owing to concentrations of mining related engineering in areas of already high unemployment, as well as near to or within areas of past or present coal mining activity, any manufacturing redundancies resulting from a further rundown of Britain's deep mining industry will add to the inequalities of economic power between and within the regions of Britain. It will also lead to a net loss of engineering skills and apprenticeship schemes within the UK, and it will seriously weaken the export base of many companies (ABMEC, 1986). The engineering infrastructure developed around deep mining over the past forty years, which has given Britain an area of globally recognised technological expertise, especially in longwall mining, will, if current policies are allowed to run their course, become another area of manufacturing decline.

Allied to such arguments are those of the local authorities, unions and NEI management, that a steady coal-fired power station ordering programme with contracts spread between the home-based manufacturers is needed to utilize both indigenous non-renewable resources, and non-transferable skills within local labour markets. Without this it will be difficult to maintain competition between the major UK suppliers for power plant equipment. Home orders for NEI

Parsons would enable it to compete against overseas competitors in the 1990s and would prevent GEC Turbines from becoming a monopoly source for turbine generators.

A paradoxical feature of the current government's emphasis on creating an "enterprise culture" in Britain concerns the deliberate encouragement of capacity cuts in the nationalised industries to improve competitiveness, partially in preparation for their privatisation. The consequent corporate strategies of the state-owned enterprises, involving large-scale plant or pit closures, has done much to contribute to the decline of private sector businesses through various income and linkage multiplier effects. The subsequent problems of reindustrialisation, low indigenous business formation and low private investment in the coalfield communities are well documented (Coalfield Communities Campaign, 1986). In spite of repeated calls for more concerted action and financial assistance to alleviate the acute problems - social, economic, environmental - affecting coalfields hit by pit closures, there has yet to be an adequate response from government. British Coal redundancy payments without alternative jobs for people made redundant, and BC Enterprise schemes, muted by limited financial resources and a narrow economic mandate, are totally insufficient to tackle the scale and depth of the problems faced by coalfield communities.

Many coalfield areas are disproportionately dependent on both mining and manufacturing employment (Fothergill and Gudgin, 1985). A loss of jobs in either or both sectors, creates serious imbalances and unemployment, particularly for males, in local labour markets. A central argument of this thesis is that there is a need to understand

the nature of the total coal infrastructure, and the close relations and linkages existing within it, in order to formulate appropriate public policy measures towards the coal industry and the particular problems faced by coalfield communities. Much more than this, there is a need for the central government, which is embarking on its most ambitious privatisation to date (i.e. of the electricity supply industry), to recognise the complex regional, industrial, social, and environmental implications of its policies relating to the energy sector.

The concluding chapters will consider some of the probable implications of the privatisation of both the ESI and the coal industry in more detail. Before that, it is necessary to consider the economic significance of opencast mining in the 1980s, and the implications of an expansion of opencast mining on the UK engineering industry.

FOOTNOTES AND REFERENCES

- (1) Numerous reports examine the social costs of pit closures in detail, and look at the problems facing reindustrialisation and employment schemes in coalfield communities. These include:- Coalfields Communities Campaign (1986) Memorandum 35 to the Parliamentary Energy Committee, Volume 1, HMSO. Also see: Glyn (1985); House & Knight (1967); Hudson, Peck & Sadler (1984); Hudson & Sadler (1985); WERU (1985). For full references the reader is referred to the Bibliography.
- (2) There are several overseas manufacturers of mining equipment in the UK. Some of the most important are: (i) British Jeffrey Diamond (BJD), the coal-cutter maker, part of Dresser Industries, USA. BJD was established in Wakefield long before nationalisation. The Jeffrey Company of Columbus, Ohio, took over the Diamond Coal Company factor in 1927 (see chapter two). (ii) Gewerkschaft Eisenhuetten Westfalen (GEW) and Dollery & Palmer, Sheffield, formed Underground Mining Machinery (UMM) in County Durham in the late 1940s. The company was one of the first in the UK to manufacture the armoured flexible conveyors, which were originally of German design. (iii) in 1954, a group of Thyssen technicians arrived at Llanelli to commence the construction of equipment for the sinking of two shafts for an anthracite mine. This was the start of Thyssen (Great Britain) Limited, which later set up a number of subsidiaries, and it became one of the major employers in the Llanelli area. In 1983 it employed some 2,000 people in the UK. Thyssen (GB) also has a plant

in west Yorkshire which does some contracting for BC. (iv) EIMCO (GB) Limited was established on the Team Valley Trading Estate in 1948. EIMCO is a part of Baker Mining Equipment of Utah, USA, which has numerous subsidiaries in different countries. (v) Joy Manufacturing, one of the major mining machinery companies of the USA, has an operating subsidiary in Glasgow, is a principal supplier of continuous miners, which have a similar function to modern power loaders but are applicable to room and pillar mining.

- (3) Members of two other trade associations also supply British Coal with engineering equipment. Coal treatment plant engineers and manufacturers are catered for by the Coal Preparation Plant Association (CPPA), which has nine members, four of which are also in ABMEC, and one of which has several sister companies in ABMEC. The Mechanical Handling Engineers Association (MHEA) has a coal handling section with 13 members, of which five are in ABMEC, one is also a member of the BLMA, and one has a sister company in ABMEC. Many of these companies are parts of large engineering groups supplying a wide range of process industries and product markets.
- (4) MSI group's pre-tax profits were £3.8 million on a turnover of £47.8 million.
- (5) Other notable mergers in the UK mining machinery industry in the 1980s include Charter Consolidated's takeover of Anderson Strathclyde and Perard Torque in the early 1980s; Becorit's takeover of Wultex in 1987.

- (6) It is so difficult to estimate the employment and other indirect costs of BC restructuring and colliery closures for a number of additional reasons. Firstly, each company has a unique market and business profile, and even most of the specialist longwall suppliers have diversified non-mining interests. Secondly, coal orders fluctuate through time depending on coal projects and levels of BC investment, product life cycles, numbers of available suppliers for particular products, technical and organisational changes within the coal industry, changes in tendering policies, etc. Thirdly, the diversity of product markets. This means that knowledge of the total business of individual companies is as important as knowledge of coal industry restructuring.
- (7) Author's research, April-June 1987.
- (8) Investment in new technology at Victor Products was encouraged by the company's involvement in the Department of Trade and Industry - supported scheme, the Teaching Company Programme (TCP). The TCP aims to bring manufacturing companies and universities and polytechnics together to develop microprocessor and micro-computer applications in manufacturing. Under the scheme, Victor worked close with Sunderland Polytechnic.
- (9) NEI have formed a number of cooperative ventures with the giant Japanese group, Mitsubishi. In 1987, NEI-ICL signed a technology agreement with Mitsubishi which covered flue-gas desulphurisation equipment. NEI has also signed a deal to

manufacture under licence circuit-breakers designed by Mitsubishi Electric. Both companies were also cooperating in a consortium supplying turbine generators to Hong Kong. International joint ventures of this kind have characterized the world power plant industry in a decade of over-capacity. Similar deals have been made between companies supplying de-sulphurisation technology for power stations, including FKI Babcock and Hitachi; Foster Wheeler (UK) and Flakt (Sweden); and John Brown (UK) and General Electric (USA) (Financial Times, 16-02-87:15).

In advance of the privatisation of the Electricity Supply Industry, there has been increasing foreign interest in the UK power plant supply industry. In July 1988, Combustion Engineering, the Connecticut-based process engineering group, bought a 35 per cent interest in NEI-ICL at Derby, which was previously a wholly owned subsidiary of NEI (FT, 11-07-88:6).

(10) Not only is the West Midlands local economy less dependent than Tyneside and Strathclyde on the power plant industry, the GEC group is only about 20 per cent dependent on the industry for it has major interests in other sectors, such as aerospace. In contrast, NEI is still estimated to be at least 70 per cent dependent on the power plant industry (TUSIU, 1988).

(11) In 1987/8, the North East's seven working pits made a record £31 million operating profit compared with £12 million the previous year which was largely absorbed by interest charges.

Nottinghamshire made an operating profit of £40 million in 1987/8 out of a total operating profit of £216 million for British Coal as a whole. Only the North East and Nottinghamshire out of BC's nine coalfields were able to turn in a net profit.

TABLE 6:1

Inputs to the Coal Industry 1973 (£ m)				
SIC order	Industry	£ m	% all expenditure	
I	Agriculture, forestry	-	-	
III	Food, drink, tobacco	-	-	
IV	Coal and petroleum products	3.3	0.7	
V	Chemicals	11.0	2.4	
VI	Metal manufacture	65.9	14.4	
VII	Mechanical engineering	81.9	17.9	
VIII	Instrument engineering	0.4	0.1	
IX	Electrical engineering	27.0	5.9	
X	Shipbuilding	-	-	
XI	Vehicles	3.5	0.8	
XII	Other metal goods	45.7	10.0	
XIII	Textiles	0.4	0.1	
XIV	Leather and leather goods	-	-	
XV	Clothing and footwear	7.2	1.6	
XVI	Bricks, pottery etc.	7.5	1.6	
XVII	Timber and wood products	21.7	4.7	
XVIII	Paper, printing, publishing	3.2	0.7	
XIX	Other manufacturing	10.1	2.2	
XX	Construction	71.4	15.6	
<hr/>				
Total (manufacturing and construction)		360.2	78.7	
 Service inputs to the coal industry, 1973 (£ m)				
SIC Order	Industry	£ m	% service expenditure	% all expenditure
XXI	Gas, Electricity, Water	51.8	52.6	11.3
XXII	Transport and Communication	30.1	30.6	6.6
XXIII	Distribution	12.6	12.8	2.7
XXIV	Insurance and banking	-	-	-
XXV	Professional and scientific	-	-	-
XXVI	Miscellaneous	3.9	4.0	0.9
XXVII	Public Administration	-	-	-
<hr/>				
Total		98.4	100.0	21.5

Source: Input - output tables 1973, Economic Trends, June 1978, p.108/9
Taken from: Hudson, Peck & Sadler, 1984, Undermining Easington

Notes: In the first table five industries account for over sixty per cent of construction and manufacturing inputs. These include all the main engineering suppliers.

TABLE 6:2

Coalface and Development Equipment Suppliers

Item of Equipment	Number of UK suppliers
Powered roof supports	3
Hydraulic power packs	4
Cutter - loaders (face)	3
Chainless haulage systems	6
Face conveying systems	8
Ripping machines (face ends)	3
Loading machines (face ends)	4
Signalling, communications and lighting	4
Roadheading machines	4
Drilling rigs	10

Note: Numerous additional suppliers of components, sub-assemblies, and important sub-contractors are excluded from this table.

Source: ABMEC (1987)

TABLE 6:3

Important Longwall Product
Markets and Suppliers in the U.K.

1. Power Loaders and Coal Shearers

Company	Percentage U.K. Market Shares *				
	1977-78	1978-79	1979-80	1980-81	1981-82
Anderson Strathclyde (Motherwell)	70.1	60.8	63.7	60.8	64.0
B.J.D. (part of Dresser, Wakefield)	22.3	28.1	28.2	27.8	27.2
Eickhoff (West Germany)	7.0	11.1	7.9	11.2	6.2
Mining Supplies (Doncaster)	-	-	0.2	0.2	2.6
	100.0	100.0	100.0	100.0	100.0

2. Roadheaders

Company	Percentage U.K. Market Shares				
	1977-78	1978-79	1980-81	1981-82	1982-83
Anderson Strathclyde	5.3	5.0	6.3	7.9	14.3
Dosco (part of Hawker Siddoley, Newark)	94.7	92.5	93.1	90.7	84.8
Thyssen G.B. Ltd. (West Germany U.K. plant, Llanelli)	-	2.5	0.6	1.4	0.9
	100.0	100.0	100.0	100.0	100.0

Note: Mindev Limited (Bolton) is on A.B.M.E.C.'s list of roadheader suppliers.

* Percentage market shares in the U.K. power loader market have remained at similar levels to 1981-82, although tiny market shares have gone to Joy Manufacturing (Glasgow).

TABLE 6:3 (continued)

3. Powered Roof Supports

Percentage U.K. Market Share	
	1986-87
Dowty Mining Equipment (Aschurch)	49.0
Gullick Dobson (Wigan)	50.0
Babcock Mining (Huwood Supports subsidiary, Swalwell, Tyneside)	1.0
	100.0

4. Armoured Face Conveyors

Listed Suppliers to British Coal, 1987-88

Dowty Mecol Limited (Worcester)
Fletcher Sutcliffe Wild (part of Dobson Park Industries, Wakefield)
Huwood (part of FKI Babcock, Gateshead)
Mining Supplies (Longwall) Limited (Doncaster)
Underground Mining Machinery (parent company, Gerwerkschaft Eisenhuetten
Westfalia, West Germany. U.K. location : Newton Aycliffe, Co. Durham)
Wultex Machine Company (subsidiary of Becorit, Huddersfield)
Anderson Strathclyde (Motherwell)
Winster Mining (Ilkeston)
R.B. Bolton (Mining Engineers) Limited (Consett)

Note: Not all the above suppliers supply complete A.F.C. systems. Some are engaged in the manufacture of drives and components, e.g. Winster and R.B. Bolton. The first four companies in the list are the principal suppliers of complete A.F.C.s, although Wultex is becoming more significant since its takeover by Becorit in 1987. Anderson Strathclyde manufactures most longwall items except powered roof supports.

Source : Company survey and A.B.M.E.C.

TABLE 6:4

The UK Mining Machinery Market

1979-86, £ million (current prices)

Year	Sales by UK firms	Exports	Imports	Apparent UK market	Export ratio %	Import penetration %
1979	720	103	11	628	14.3	1.8
1980	764	62	16	718	8.1	2.2
1981	599	72	10	537	12.0	1.9
1982	720	86	15	649	11.9	2.3
1983	630	71	18	577	11.3	3.1
1984	507	108	16	415	21.3	3.9
1985	631	111	21	541	17.6	3.9
1986	729	105	22	709	13.3	3.1

Note: The big increases in the export ratio were in the year of the national miners' strike 1984/5 when home consumption of mining machinery was at a low level.

These import / export figures are based on the official definition of the mining machinery industry (activity heading 3251). ABMEC statistics are based on the exports of its member companies.

Source: Business Monitor

TABLE 6.5

Regional Employment in the Mining Machinery Industry
Activity 3251 : 1978 and 1987(1)

REGION	Total Employees (No. of establishments)			
	1978		1987	
South East	647	(9)	359	(6)
East Anglia	13	(1)	No data	
South West (2)	149	(4)	28	(2)
West Midlands	1,049	(12)	546	(9)
East Midlands	5,447	(26)	2,892	(20)
Yorkshire & Humberside	4,690	(30)	3,550	(23)
North West	3,238	(11)	2,071	(8)
Northern	3,407	(14)	2,259	(17)
Wales	1,249	(11)	470	(8)
Scotland	3,695	(10)	2,794	(9)

TOTALS	23,584	(128)	14,969	(102)

Source : E.I.T.B. Company Returns

Notes:

- (1) Several important mining equipment suppliers engaged in supplying British Coal (N.C.B. prior to 1986) are excluded from this table owing to the listing of their main activities under different 4-digit MLH categories. If a mining equipment company is part of a large engineering group engaged in various activities it may be listed under a different heading.
- (2) The regional statistics provide a reasonable picture of the broad distribution of mining machinery activity, but mask considerable sub-regional differentiation. The statistics also provide incomplete coverage of mining machinery activity defined by MLH 3251. A notable example is the South West of England. Dowty Mining Equipment Limited, employing 1,354 people in June 1985, manufactures powered roof supports but is excluded from these statistics. Many suppliers of mining equipment in all regions are excluded from the official definition.

TABLE 6:5

Definition Activity 3251

The Mining Machinery Industry

Standard Industrial Classification : Activity Heading 3251

- Mineral cutting machinery, including loading machines, continuous miners and tunnelling machines;
- Underground mineral transport machinery, including conveyors and stationary hauling engines;
- Mine shaft and roof support machinery, including sinking and winding machines, cage plant, pit bottom machines and mine roof supports (including powered roof supports);
- Mineral dressing and other mining machinery, including plant for on surface treatment and dressing of coal and other minerals;
- (Mineral crushing, pulverising and screening plant is classified to heading 3254/2. Mine railway equipment is classified to heading 3620).

TABLE 6:6

Employment in the mining machinery industry 1978 - 1987

Year	Total employment	Number of establishments
1978	23,584	128
1979	23,924	126
1980	23,407	125
1981	21,758	126
1982	19,859	121
1983	18,748	121
1984	16,399	112
1985	15,720	108
1986	15,787	111
1987	14,969	102

Source: Engineering Industry
Training Board (EITB), 1988

TABLE 6:7

Production indices for mechanical engineering and selected mechanical engineering industries, including mining machinery

Class / Activity Heading	1981	1982	1983	1984	1985	1986	1987
32 Mechanical engineering	88	90	85	86	90	90	92
3221 Metal-working machine tools	69	63	58	65	78	76	78
3251 Mining machinery	76	85	71	58	67	84	78
3254 Construction and earth-moving plant	91	78	71	73	85	78	80
3255 Mechanical lifting and handling equipment	83	87	88	91	93	93	95

Notes: UK mechanical engineering output indices (1980 = 100)

Output in the mining machinery industry has remained at a low level throughout the 1980s. In 1984 the industry was severely affected by the national coal dispute. In 1986 production recovered to levels recorded in years of stronger home demand in the late 1970s, but this increase was more the result of exceptional export orders rather than a recovery in the home market. Over the whole period only the metal-working machine tool industry has performed worse than mining machinery in terms of production indices. But it is necessary to add that the mining machinery industry enjoys negligible import penetration, especially in the deep mining sector, whilst the UK machine tool industry has had import penetration levels of over 60 per cent in some years (see Sciberras and Payne, 1985). Both activity heading 3254 and 3255 include suppliers to BC. 3254 includes many suppliers to the opencast mining industry, but the relatively low output levels for this group are mainly the result of worldwide over-capacity in the construction equipment industry rather than events in the UK mining industry (see chapter seven for details).

FIGURE 6:7

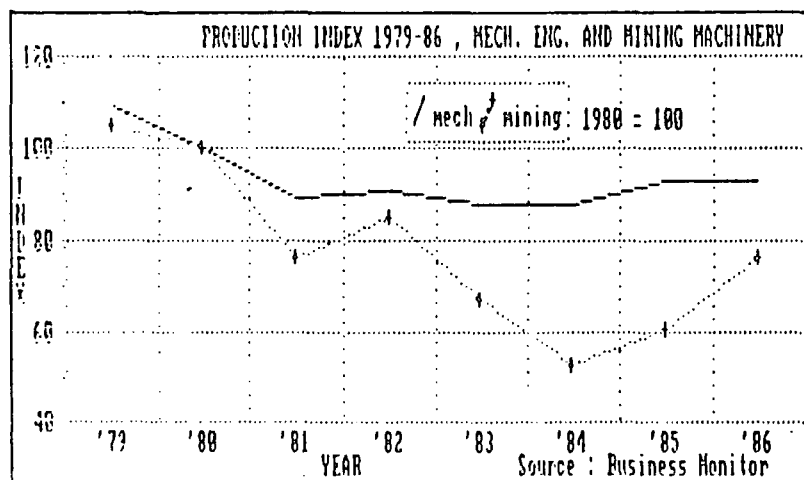


TABLE 6:8

Anderson Strathclyde employment

Location	No of employees	Some suppliers and sub-contractors
<hr/>		
Scotland:		
Motherwell	2,050	A F W Engineering Ltd
Bridgeton	655	Giddings & Lewis Fraser Ltd
Glenrothes	325	Gordon H Barclay & Associates
Kirkintilloch	230	Hurstwell Engineering Co Ltd
East Kilbride	115	J Martin Engineers (Wishaw)
		North British Steel Group
		Northern Tool & Gear Co Ltd
		W McCrindle & Son Ltd
	<hr/>	
	3,385	
England:		
Saunderton	285	
Sheffield	105	
Princes Risborough	100	
	<hr/>	
	490	
Total United Kingdom	3,385	
Overseas:		
South Africa	250	
Australia	150	
United States	45	
	<hr/>	
	445	
Group Total	<hr/>	
	4,320	
	<hr/>	

Note: These figures are for 1981/2. The company also generates jobs in other firms. The MMC (1982) report on Anderson's takeover by Charter Consolidated listed the above named suppliers.

TABLE 6:9

Unemployment in South Yorkshire, January 1987

Travel-to-work-areas	No. of claimants	Percentage Rate
Doncaster	18,499	18.3
Barnsley	13,786	17.1
Rotherham & Mexborough	20,149	19.5
Sheffield	40,539	14.3
South Yorkshire	90,872	16.4
Yorkshire & Humberside	266,031	12.8
United Kingdom	2,722,154	11.0

Note: As some TTWA's cross the county boundary, their figures do not sum to the total for South Yorkshire

Source : National On-line Manpower Information system

TABLE 6:10

Employment by occupation in the UK mining machinery industry
in Yorkshire and Humberside

Year	Occupational category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	No.of estabs
1978		237	36	419	185	664	208	1631	1310	4690	30
1979		237	31	430	190	685	222	1662	1274	4731	29
1980		226	19	510	193	657	242	1636	1301	4784	30
1981		231	26	552	262	632	234	1730	1230	4897	31
1982		244	15	549	312	509	243	1623	1228	4723	31
1983		256	15	530	264	486	203	1610	1056	4420	30
1984		283	38	457	233	485	212	1406	932	4046	27
1985		258	40	402	221	423	189	1349	822	3704	24
1986		262	35	397	263	387	195	1445	848	3832	25
1987		281	58	412	196	381	168	1294	760	3550	23

Note: For details of the occupational categories refer to Occupational
Categories list

Source: Engineering Industry
Training Board (EITB), 1988

Notes to Table 6:10 (and 6:14)

OCCUPATIONAL CATEGORIES LIST

(Numbers as they appear on tables)

- (1) Managerial staff: includes working directors and managers. Excludes supervisors and foremen, who should be included in category 5. Excludes persons who may be training for management positions but who are not yet of managerial status; management trainees are included in category 4a.
- (2) Professional engineers, scientists and technologists: includes persons engaged in or being trained for technical work for which the normal qualification is a university degree in engineering, science or technology. Managers and technical directors possessing such qualifications are included in category 1.
- (3) Technicians and technician engineers: includes persons carrying out functions of a grade intermediate between scientists and technologists on one hand and skilled craftsmen and operators on the other, whether in research or development, design, production, testing or maintenance.
- (4) Administrative and professional staff: includes administrative, training and personnel staff, business professionals, business technicians, welfare staff, buyers, salesmen and representatives, safety officers, trained security staff; includes also all professionally qualified employees not included in categories 1 or 2, above, eg accountants and lawyers, includes, also, management trainees.
- (5) Clerks, office machine operators, secretaries and typists: includes all clerks, including cost and accounts clerks, tracers, duplicating equipment and addressing machine operators, comptometer operators, telephone and telex operators, receptionists, shorthand, audio and copy-typists.
- (6) Supervisors: includes full-time foremen and supervisors in offices, laboratories, etc, ie all staff whose main activity is supervision. Excludes chargehands, office and other staff with only part responsibility for supervision.
- (7) Craftsmen: includes only those employees in occupations for which a worker has usually qualified after receiving a recognised period of apprenticeship or equivalent training.
- (8) Operators and other employees: includes all occupations other than those already included in categories 1 to 6 above, whether in production, maintenance, transport, stores or other departments, except canteen staff and seafarers.

TABLE 6:11

Survey of British Coal Suppliers
in Yorkshire & Humberside, 1987.

Company	Location	Products & Markets	Coal related turnover * (Percentage)	Total Employees Aug.-Oct. 1987 *
Cotefield Engineering Limited (C.E.C.)	SHEFFIELD (Dinnington)	hydraulic cylinders to mining machinery firms and pumps, valves, motors and cylinders to B.C.	75 - 80 (1.2M '87)	41
Padley & Venables	" (Dronfield)	"Thru-Plush" pick system for longwall shearers & roadheaders (e.g. for B.J.D., and Dosco).	8	360
N.E.I. Mining Equipment Ltd. (Baldwin &	"	flameproof switchgear, gate-end boxes, circuit breakers, lighting units.	80 - 90	130 (Jan '86)
D. Learad Ltd. Francis)	"	tub wheels and axles, railway track maintenance tools.	None since 1984-85 coal dispute	20
Tinsley Wire Limited (TWIL Group)	"	industrial and speciality wires.	3	1,100 (50 B.C. related)
Boart (U.K.) Limited	"	drilling equipment, roof- bolts, and sleepers	60 - 80	64 (June '87)
Mining Supplies (Longwall) Ltd. (Mining Supplies International)	DONCASTER (Carr Hill)	range of longwall machines, mainly coal cutting equip- ment for B.C. and overseas.	100	290
ACE Conveyor Equipment Ltd.	" (Harworth)	vulcanising and conveying equipment for many markets	8	97
Screen Products Limited	ROTHERHAM	welded and looped wedge wire panels, fixed sieves, curved & tubular sections, screening systems.	50 - 60	13
James Fairley Steels (J.F.S.)	"	steel products, alloy, carbon, and stainless and forged bars. Various markets.	21	71

Table 6:11 (Continued)

Company	Location	Products & Markets	Coal related turnover *	Total employees Aug.-Oct. 1987 *
Wultex Machine Company (Becorit, since 1987)	WAKEFIELD (Horbury) & HUDDERSFIELD	fabrication and machining work. A.F.C. line pans and conveyors.	90	140 (hourly paid only June '86)
Thomas Broadbent & Sons Ltd.	HUDDERSFIELD	design and making of industrial centri- fuges for a complete range of process industries in U.K. and overseas.	10 - 15	340 (80 coal related work)
Holset Engineering Company Ltd. (Vibration Products)	HALIFAX	torque transmitting flexible rubber block couplings and moulded rubber products for all types of mining machines.	20 (of coupling sales only)	1,200 (962 at Hud'sf'ld factory & rubber dept.)
OMEC Engineering Limited	SHERRBURN IN ELMET (nr. LEEDS)	shaft and winding equipment, skips & cages, coal face trim, underframes, various types of pulleys.	60 - 65	130
John King & Co. Ltd.	LEEDS	drive and conveyor chains	2	150
Yeadon Hydraulics Limited	YEADON (West Yorks)	intrinsically safe and flameproof valves, hydraulic & pneumatic rams for various markets	24 (65 pre-'84 /'85 strike)	5 (on coal related work)
Fenaplast (Conveyor belting division of J.H.Fenner & Co.	HULL	conveyor belting	80	350 (on coal related work)

Source: Postal Questionnaire and Interviews

Note: * means where otherwise stated. The numbers employed are mostly for the time of the postal survey, August - October 1987. Some companies gave numbers of people engaged in coal-related work, and these figures are included in the table. It is important to point out that for all the companies coal-related turnover and employment fluctuates greatly according to B.C. and overseas contracts, and many companies supply other B.C. suppliers as well as B.C.

Table 6:11 (Continued)

Company	Location	Products & Markets	Coal related turnover * (Percentage)	Total employees Aug.-Oct. 1987 *
W.E. Burnand (part of Emil Engineering, owned by Aurora)	ROTHERHAM	member of Aurora, the Sheffield group making special steels, machine tools. W.E.B. make suspended electromagnets, magnets for handling magnetite in coal washing.	1 - 5	No data
Pitcraft Summit (Dobson Park Industries)	BARNSELEY	"Rackatrack" chainless haulage systems, pumps, dust suppression equip- ment, line pans, for B.C. and F.S.W.	100	240
Qualter Hall (part of Matthew Hall plc.)	"	mining engineering, mainly mineshaft equipment	90	180 (Mar'87)
Walter Frank & Sons Limited	"	fire hose couplings and ancilliary equipment for local firms B.J.D., F.S.W., and B.C.	coal related turnover 8,000 direct 41,000 indirect	72
Fletcher Sutcliffe Wild (F.S.W., Dobson Park Industries)	WAKEFIELD	pumps, conveyors, A.F.C.s, chainless haulage. Mainly for coal mining, but also for C.E.G.B., quarries, cement, English China Clays.	90	500 (1986)
British Jeffrey Diamond (B.J.D., Dresser U.K.)	"	longwall mining equipment e.g. ACE shearers, crushers and "Rola Loda" tractor/ trailers.	100	821 (Jun'87)
Raybrook Precision Moning Co.Ltd.	"	liquid rheostat units, control pulpits, arc shutes, and coolers for B.C., N.E.I., G.E.C.	60 - 70	15
Alfred Ellis & Sons Limited	"	spares, forgings, new castings for several private firms and B.C. Markets include machine tools, textiles, automotive (tractors), and steel.	20	50
Monson - Tison (Atlas Copco)	" (Ossett)	oil hydraulic valves mainly to other industries	2	No data

Table 6:12

Survey of Supplier Firms to British Coal

Firm	Nos Employed	% of Turnover with BC	% Change in sales since 1986	Job Loss
1.	760	90	-11	130
2.	445	70	-20	75
3.	200	10	+12	0
4.	12	70	-50	0
5.	7	40	0	0
6.	20	50	-20	0
7.	4	10	0	0
8.	28	1	0	0
9.	5	46	-45	0
10.	45	5	-50	0
11.	200	1	0	0
12.	6	5	0	0
13.	68	90	-15	2
14.	99	18	0	0

Note : All these firms are suppliers located within the Wakefield Metropolitan District Council boundaries

Taken from O'Donnell (1988)

TABLE 6:13

ABMEC member companies in the Yorkshire and Humberside Region

Company name	Place	Principal products
* Boart (UK)	Sheffield	Hydraulic drilling equipment and roof bolts
R E Barker & Co Ltd	Pontefract	Rope haulage pulleys and rollers
* BJD (Dresser Industries)	Wakefield	Longwall shearers, chainless haulage systems mineral crushers
BSC General Steels	Scunthorpe	Underground roadway supports
* Cotefield Engineering Ltd	Sheffield	Hydraulic cylinders
Croda Application Chemicals Ltd	Goole	Lubricating gear and hydraulic mineral oils
English Drilling Company Ltd	Huddersfield	Diamond core drills and exploration equipment
* J H Fenner & Co Ltd	Hull	Conveyor belting
* FSW (Dobson Park)	Wakefield	Belt conveyors, conveyor structures and bunkers, drive units, AFCs
GKN Colcrete Ltd	Wetherby	Pump packing, cavity sealing and roadway sealing equipment
Hayden Nilos Conflow	Sheffield	Dust suppression sprays, fire fighting equipment, mine hydraulics monitoring equipment
Hunslet (Holdings) Plc	Leeds	Underground locomotives
Lindley Flowtech Ltd	Bradford	High pressure water valves
* Mining Supplies (Longwall) Ltd (1988, Dobson Park Industries)	Doncaster	Underground coal handling plant and shearer equipment
The Morely Electrical Co Ltd	Pudsey	Flameproof motors, components for conveyors
Needham Bros & Brown	Barnsley	Haulages and shaft hoists

Note: Table 6:13 continued on next sheet

TABLE 6:13 continued

Company name	Place	Principal products
* NEI Mining Equipment Ltd (various UK plants)	Sheffield HQ	Flameproof switchgear and control gear, communication and signalling equipment
PTT (Perard Torque Tension, part of Anderson Strathclyde)	Sheffield	Tunnelling equipment, rock drilling and roof bolting equipment
* Pitcraft Summit Ltd (Dobson Park)	Barnsley	'Rackatrack' chainless haulage systems, dust suppression equipment
* Qualter Hall & Co Ltd (Matthew Hall plc)	Barnsley	Shaft systems and bulk handling schemes
Scandura	Cleckheaton	Fire resistant solid-woven pvc conveyor belting
Webster Machine Co Ltd	Rotherham	Face end and tunnelling equipment
* Wultex Machine Co Ltd (Becorit)	Huddersfield	Armoured conveyors, belt conveyors, line pans, stage loaders, conveyor trim and fabricated structures for mines and quarries

Note: * Indicates firms included in the author's survey.

13 out of 23 ABMEC member companies in the region were not included in the author's survey (see Table 6:11). The fact that both the author's survey and that conducted by O'Donnell (1988) includes a number of firms outside ABMEC indicates the fact that British Coal supports a large number of engineering establishments within the region both within and outside the Standard Industrial Classification (SIC, 1980) definition of the mining machinery industry (3251) (see Table 6:10). Several firms listed above are simultaneously primary and secondary suppliers to the coal industry, that is they supply equipment direct to BC and components to other mining machinery manufacturers.

Source: ABMEC (1988)

TABLE 6:14

Employment by occupation in the mining machinery industry
in the Northern Region*, 1978 to 1987

Year	Occupational category (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Total	No. of estabs
1978	150	16	223	107	428	126	1106	1251	3407	14
1979	151	17	239	126	438	127	1114	1300	3512	13
1980	158	23	264	135	440	134	1117	1326	3597	14
1981	139	22	246	154	366	149	935	1101	3112	14
1982	136	19	172	139	288	133	774	837	2498	12
1983	149	20	192	172	278	123	806	818	2558	13
1984	149	37	176	155	254	117	754	723	2365	13
1985	152	39	166	137	221	118	694	659	2186	16
1986	154	44	179	131	243	105	689	696	2243	17
1987	173	62	172	148	244	93	645	722	2259	17

Notes: Occupational categories 5, 7 and 8 all show percentage declines in employment of over 40 per cent between 1978 and 1987. Category 5 covers clerks, secretaries, typists and office machine operators, and it is the major area for female employment in the industry, as in other mechanical engineering industries. It accounts for around 11 per cent of total mining machinery employment in the Northern Region in 1987. Whilst most of the analysis in chapter six is devoted to job losses as a result of the decline in British Coal orders, it is often assumed that most of the redundancies in the industry are in traditional craft skills and semi-skilled manual jobs mostly for men. This is true to some extent (see categories 7 and 8), but women have been particularly affected by the introduction of new office machinery and office automation technology. There have been some areas of job increase in managerial (1), administrative (4), and particularly in posts for professional engineers, scientists and technologists (2) with the growing application of microprocessors in both products and production processes, and attempts at computer integration via CAD/CAM in many companies (see Senker, 1984). It is useful to add that the broad occupational trends shown in this table are similar to those of other regions (see Table 6:10), and for the mining machinery industry as a whole.

* Whilst the Northern Region includes Cumbria, virtually all mining machinery employment is in the North East.

Source: EITR (1988)

TABLE 6:15

List of North East suppliers to British Coal

(1) Primary Suppliers	Mining products
Huwood Limited (FKI Babcock)	Underground and surface conveyors, belt conveyor drives, conveyor structures, idlers and components, AFCs and stage loader chain conveyor drives and components. Another plant at Swalwell manufactures chock type supports and a range of heavy-duty chock shields for longwall mining.
EIMCO	Load-haul dumps and free steer vehicles; face drilling jumbos, hard rock tunnelling machines, roof bolting machines; continuous miners for room and pillar mining.
* Holywell Mining Group Ltd	Consumable items for roof supports, as well as stilts, fishplates, bracketry, sleepers, roadway lining panels, roof bolting accessories, tunnel circular yeilding supports. Plus a wide range of safety equipment and environmental control products
* R B Bolton (Mining Engineers)	Armoured face conveyors, chain conveyors; hydraulic winches for powered support installation / withdrawal; mineral and man-riding haulages; chainless haulage systems for any shearer loaders.
Victor Products (now part of NEI)	Compressed air, flameproof electric and hydraulic drilling equipment; flameproof connectors, face signalling connectors and flameproof switches; underground lighting for roadways, machine luminaires and lighting systems for longwall faces.
* Underground Mining Machinery (UMM - GFW, West Germany)	Complete face conveyor systems, stage loaders and sizers for handling minerals; diesel and battery locomotives, monorail systems, underground transfer stations and cranes.
Davy McKee (Stockton) Ltd (member of the CPPA)	Coal preparation plant and complete mine engineering systems.
* British Engines Limited (CMP Mining Division)	Flameproof cable accessories. Another division makes hydraulic pumps.

Notes: * Denotes companies who also supply components to other BC suppliers
For all these firms BC represents a major market.

TABLE 6:15 continued

(2) Other listed suppliers to BC in the North East (all non-ABMEC)

B B Drilling Ltd
Commercial Plastics Special Products Ltd
Davy Forge Ltd
Draegar Safety
ITM Head Wrighton Teesdale Ltd
Mitchell Bearings
Raine & Co Ltd
Sturdy Electric Co Ltd
Tomlinson Hall & Co Ltd
Tyne Tube Services Ltd

(2) Plant hire and machinery contractors to BC in the North East

Hire Plant Eastern Limited (Billingham)
Seymour, W T (Stockton) Ltd (Billingham)
Stockton Plant & Equipment Ltd (Stockton)
Stanley Davies Crane Hire Ltd (Stockton)
Selwood Works Dry Ltd (Middlesbrough)
Abelson Plant Ltd (Gateshead)
Scottish Hand (Plant Hire) Ltd (Stockton)
H R Maughan & Sons (Bedlington)

Notes : (1) Primary suppliers are most adversely affected by the decline in national purchasing from British Coal. These firms have several local suppliers of raw materials, components, and some sub-contractors, although the level of sub-contracting fluctuates with orders and the total level of coal related business. It is in these companies that there are thousands of jobs associated with coal mining.

(2) For most of these companies BC represents only a minor market accounting for less than ten per cent of total sales turnover. Even so, a loss of the BC market, and a decline in business generated by other manufacturing companies in the region, is likely to lead to some rationalisation measures.

(3) The list of plant hire firms in the North East is far from complete. These firms have done some business with BC within the area but taken together they probably employ fewer than 100 employees.

The purpose of this table is to show the variety of different firms affected by coal industry restructuring both nationally and within the North East. It is not a comprehensive list of all engineering suppliers to the mining industry.

Source: Author's research and Trade Union Studies Information Unit

TABLE 6:16

Employment change in mining machinery suppliers in the North East

Company	Plant	Total employment			
		June 1973	June 1979	June 1985	Jan. 1988
Huwood Limited	Team Valley, Gateshead	1,300	1,450	820	270
Victor Products	(Total Group figure)	450	900	750	490
Victor mining division	WallSEND	(no data)		(274)	(180)
EIMCO	Team Valley, Gateshead	300	350	320	(no data)
R B Bolton	Consett and Blaydon	150 (Consett)	210	195	185
U M M	Newton Aycliffe	640	550	270	175*

Notes: 1) Huwood's Swalwell factory making roof supports was not surveyed.
 2) Holywell Mining Group did not return the author's questionnaire.
 3) The author has no recent employment data for EIMCO.
 4) Three of the figures are based on press reports of redundancy announcements which may not always be translated into actual compulsory redundancies.

* The figure for UMM is for June 1987, not January 1988.

If the totals of four of the companies (excluding EIMCO) are added together, there has been a drop in total employment of 1990 people between June 1979 and January 1988.

Source: Author's questionnaires and press reports

TABLE 6:17

Job losses in NEI in Tyneside, 1980 - 86

Year	Parsons(1)	Reyrolle(1)	Electronic(2)	NSL(2)	Totals(2)
1980	450	850	-	-	1300
1981	706	800	-	-	1506
1982	-	44	-	-	44
1983	283	236	25	-	544
1984	53	286	125	1188	1652
1985	24	19	62	-	105
1986	770	135	-	190	1095
Total	2286	2370	212	1378	6246

Notes : (1) Figures for Parsons and Reyrolle are actual redundancies which occurred.

(2) Remaining figures, are from press reports and announcements and therefore cover redundancy announcements which may not always become actual compulsory redundancies.

Source : This table is taken directly from District Councils in Tyne & Wear and NEI Tyneside Trade Unions (1986)

TABLE 6:18

World power plant export leaders, 1981 - 1986

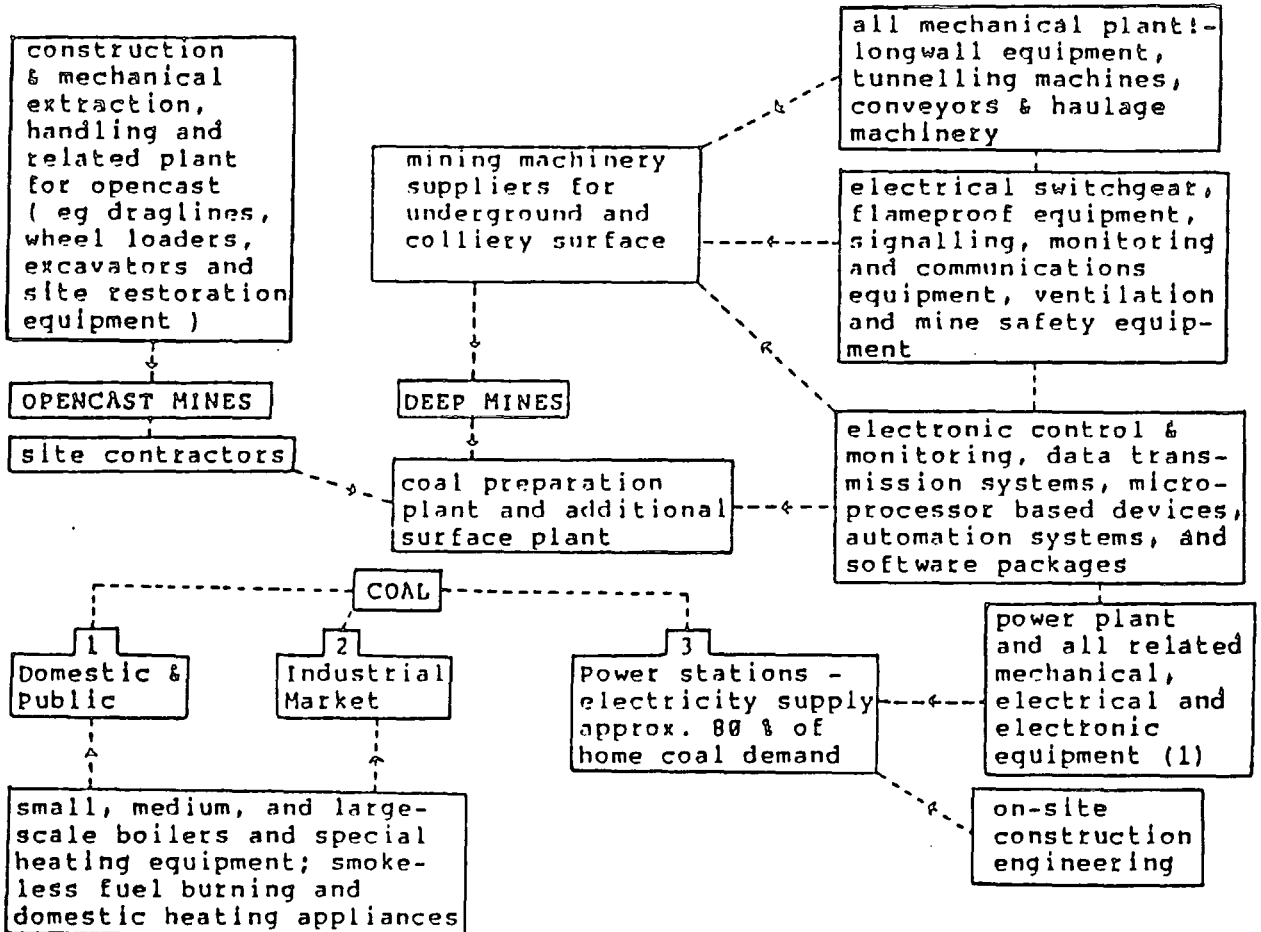
Rank	Company name	Total export orders Megawatts (MW)	Share of total export market (%)
(1)	Mitsubishi	12,900	14.9
(2)	G E C	11,500	12.5
(3)	U S S R	8,700	9.5
(4)	Toshiba	7,800	8.5
(5)	K W U	6,900	7.5
(6)	Hitachi	6,800	7.4
(7)	* General Electric	6,400	7.0
(8)	Comecon (other than the USSR)	5,100	5.5
(9)	Brown Boveri	4,600	5.0
(9)	Westinghouse	4,600	5.0
(11)	M A N	4,000	4.3
(12)	Alsthom	3,000	3.3
(13)	* N E I	2,500	2.7
(14)	Tosi	2,100	2.3
(15)	Ansaldo	1,800	2.0
—	Others	3,200	3.5
Total		91,900	100.0

* Denotes British companies

Taken from : Financial Times, 16-02-87,
'Electricity Survey'

FIGURE 6:1

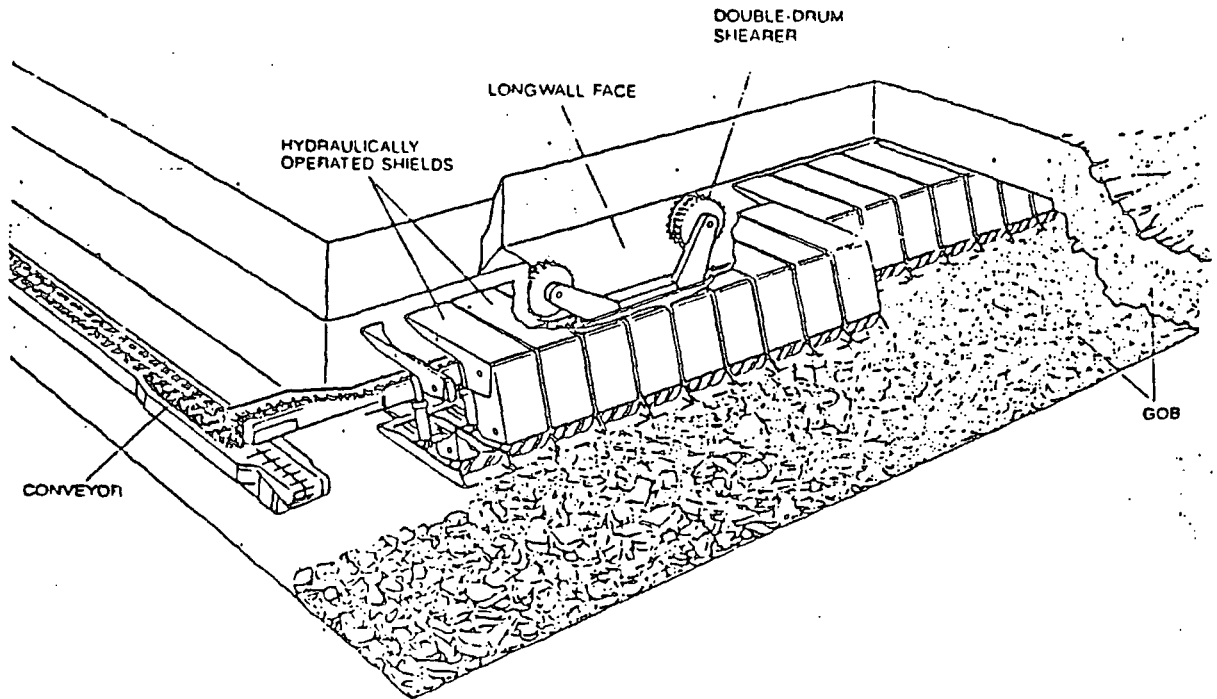
Engineering Linkages with the Coal Chain



Notes: (1) Power plant sector covers not only the main items - boilers, turbine-generators, and switchgear, but all associated plant, such as pipework, steel fabrications, advanced electronic controls, etc. As well as flue gas desulphurisation (FGD) and nitrogen oxide (Nox) pollution control technology, more efficient combustion technologies, including combined heat and power (CHP) plant.

(2) The figure is meant to show some of the main groups of technology supply linkages with the coal chain - from coal production, preparation, and use, but it does not show the complex inter- and intra- sectoral linkages within the engineering industry. Large engineering groups like NEI, GEC, FKI Babcock, Hawker Siddeley, Dowty, Dobson Park, have subsidiaries operating in diverse energy product markets. Several traditional mechanical engineering firms now have in-house electronics departments.

FIGURE 6:2



The Mechanised Longwall Mining System

Longwall mining, which has been common in British and European mines for many years, exploits a continuous mining machine that either planes or shears coal from one surface of a block 500 feet wide and up to a mile long. The machine shown is a double-ended ranging drum shearer (DERDS). The cutting machine makes continuous passes across the entire face. When a panel has been mined out, the cutter and supports are moved to the next panel. On modern coal-faces the advance movements are controlled electronically, and all machines are fitted with electro-mechanical devices. The armoured face conveyor (AFC) has hinged 'snaking' sections and is moved forward, section by section, by hydraulic rams attached to the supports. The roof behind the supports is allowed to collapse, leaving rubble called 'gob'. All items of machinery in the 'system' have to be compatible.

FIGURE 6:3

UK power plant suppliers with mining machinery subsidiaries

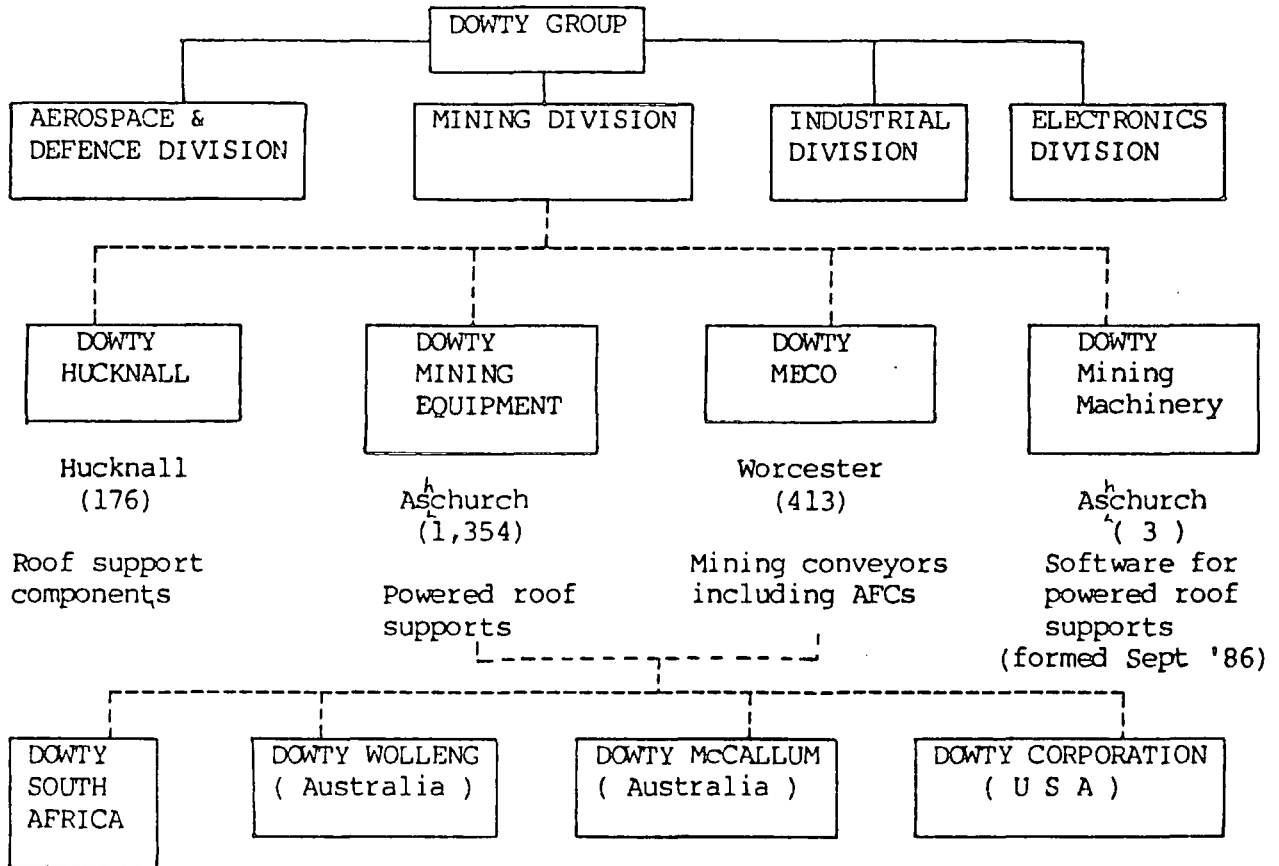
GEC	FKI Babcock	NEI
Mining suppliers	Mining Division	Mining Division
<ul style="list-style-type: none"> * GEC Electrical Projects (Rugby) * GEC Mechanical Handling (Leicester) * GEC Switchgear (Manchester) GEC Transmission and Distribution Projects (Stafford) GEC Witton Kramer (Rowley Regis) 	<ul style="list-style-type: none"> * Babcock Mining UK (Gateshead HQ) * Huwood (Gateshead) * Babcock Roof Supports (Swalwell) * Huwood Control Systems (Hucknall) * Babcock-Moxey Ltd (Gloucester) Magco Ltd (Stourport-on-Severn) * Parsons Chain Company (Stourport-on-Severn) 	<ul style="list-style-type: none"> * NEI Mining Equipment (Sheffield HQ) Baldwin & Francis (Sheffield and Altrincham) Clayton Equipment (Derby) Reyrolle Belmos (Sheffield and Blantyre) * DAC Business Unit (Burton-upon-Trent) * Victor Products (Wallsend)
Hawker Siddeley		
<ul style="list-style-type: none"> * Brush Electrical Machines (Loughborough) * Brush Transformers (Loughborough) * Crompton Parkinson Cables (Derby) * Dosco Overseas Engineering (Newark) * Hawker Siddeley Dynamics Engineering (Welwyn Garden City) * Oldham Crompton Batteries (Stockport) 	<ul style="list-style-type: none"> Babcock-Bristol (Kidderminster) 	<ul style="list-style-type: none"> (Below are NEI firms with some BC sales) NEI-APE (Bedford) NEI Clarke Chapman (Gateshead) NEI Peebles (Edinburgh) Allen Gears (Pershore and Worcester)

(* denotes ABMEC member companies)

Sources: Company reports, ABMEC, Colliery Guardians

FIGURE 6:4

Dowty Group Organisation and Mining Division Profile



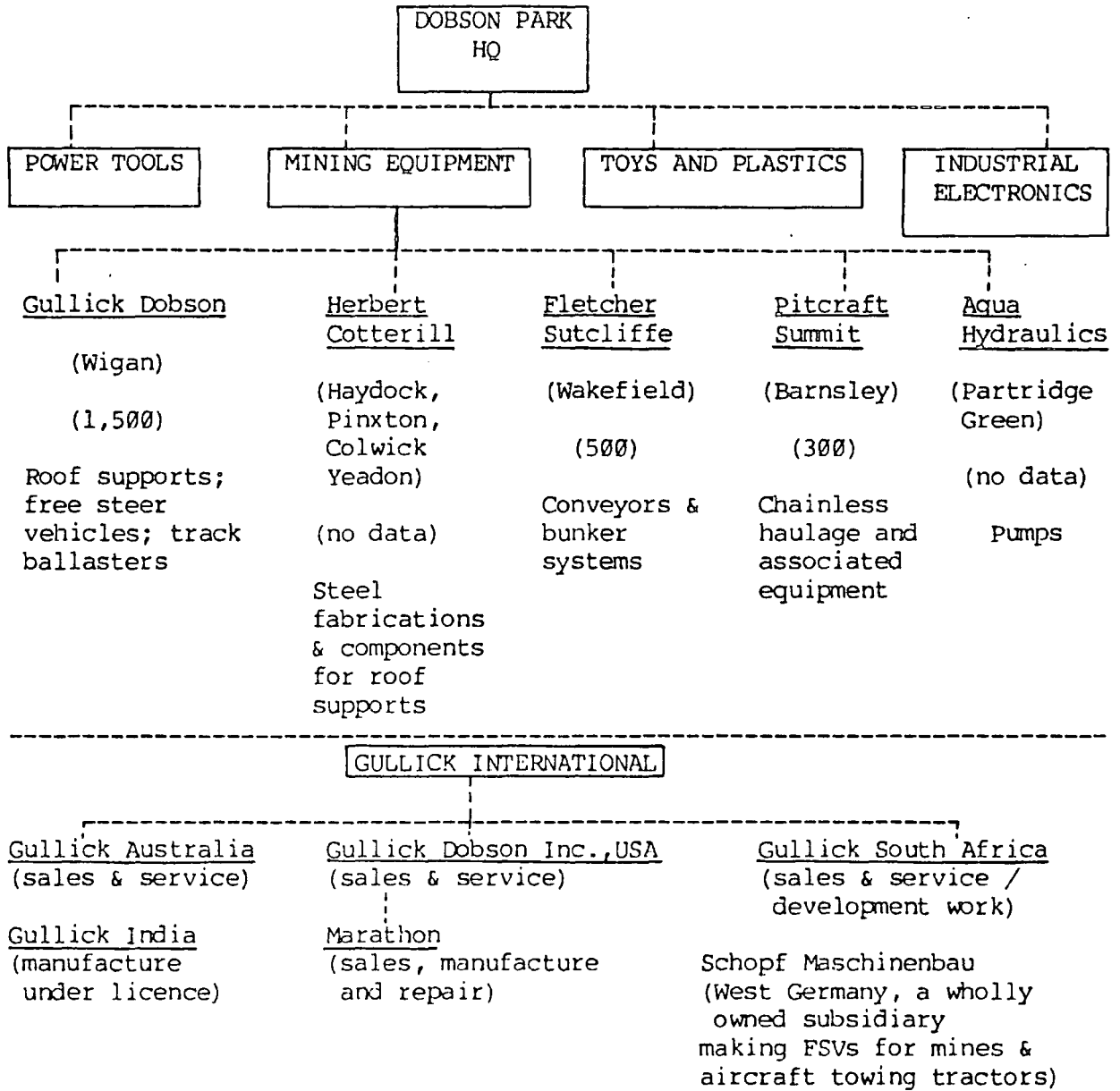
Dowty Group	Profit Margin %age			Employment		
	1981	1983	1985	1981	1983	1985
Aerospace	17.2	11.8	11.8	8,013	7,058	6,957
Mining	6.7	6.5	6.3	3,303	3,082	2,481 *
Industrial	6.3	4.8	9.0	2,644	2,336	2,366
Electronics	9.7	9.7	9.2	1,539	1,856	2,831
Dowty Group	11.6	9.0	9.5	16,635	15,345	15,414

Notes: * This figure is for the end-of-financial year 1984/5, ie March '85
 The author's questionnaire for Dowty of January 1986 was returned and showed the employment figures given in brackets for the UK plants of the mining division. Total employment in Dec.'85 for the division was 1,946 people, ie an employment decline of over a third since 1981. Since 1985, Dowty have added Dowty Automation Systems at Nottingham to the mining division. Source : Dowty



FIGURE 6:5

Profile of Dobson Park Industries (1986)



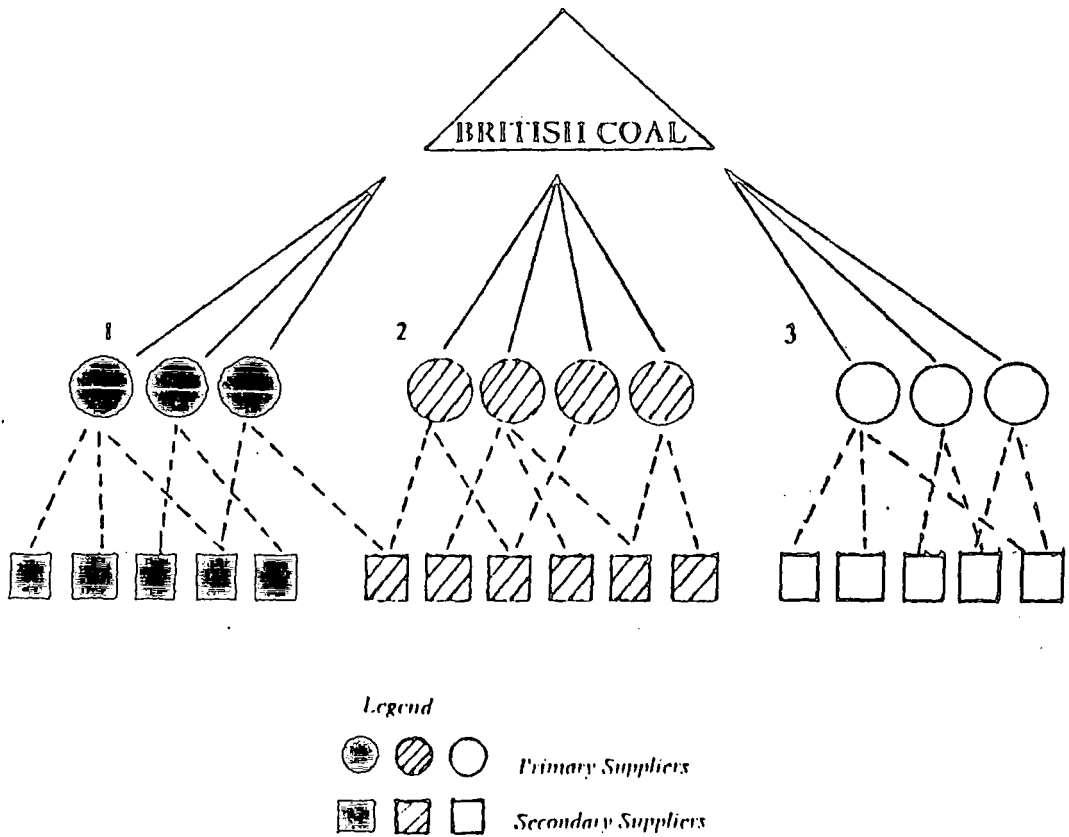
Division	Employees (1985/6)	Turnover (£ 000)	Profit (£ 000)
Mining Equipment	3,024	154,550	8,833
Power Tools	818	25,348	1,03
Toys and Plastics	(no data)	20,562	1,544
Industrial Electronics	(no data)	6,074	749
Other Engineering	1,779	11,404	(1,016)

Note : Mining Supplies (Longwall) at Doncaster was added to Dobson's mining division in 1988. For other acquisitions since 1986 see text.

Source : Dobson Park Industries

FIGURE 6:6

BRITISH COAL SUPPLY CHAIN



Each circle and square represents an individual company. Different shading denotes distinct product markets.

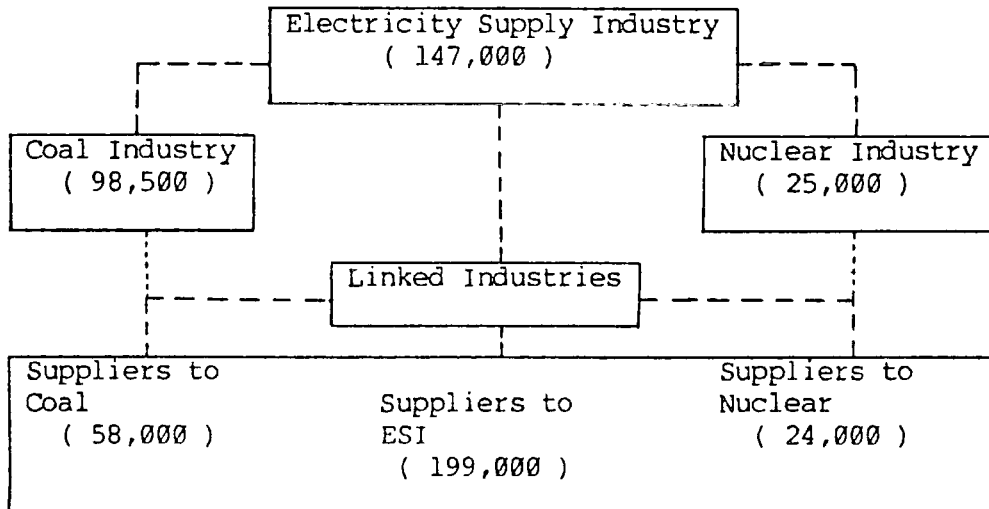
Notes: This is a highly simplified diagrammatic representation of the relationship between British Coal and its suppliers.

The primary suppliers deliver goods direct to BC. They in turn have secondary suppliers of raw materials, components and sub-assemblies. Some of the secondary suppliers are sub-contractors. Supply relationships can be very complex, and secondary suppliers can supply more than one primary supplier. In turn there are third and fourth level suppliers down the line. Some firms are both primary and secondary suppliers.

FIGURE 6:8

Generating Jobs

Employment dependency on the electricity supply industry (1986/7)



Notes : The author's study of linkages with the coal industry shows the complexity of supply chains with British Coal, involving not only primary equipment suppliers but various sub-contractors, raw materials suppliers, and capital goods suppliers to the primary suppliers. This means it is very difficult to estimate the total number of coal related jobs that are linked to the ESI, ie dependent on coal supplied for electricity generation.

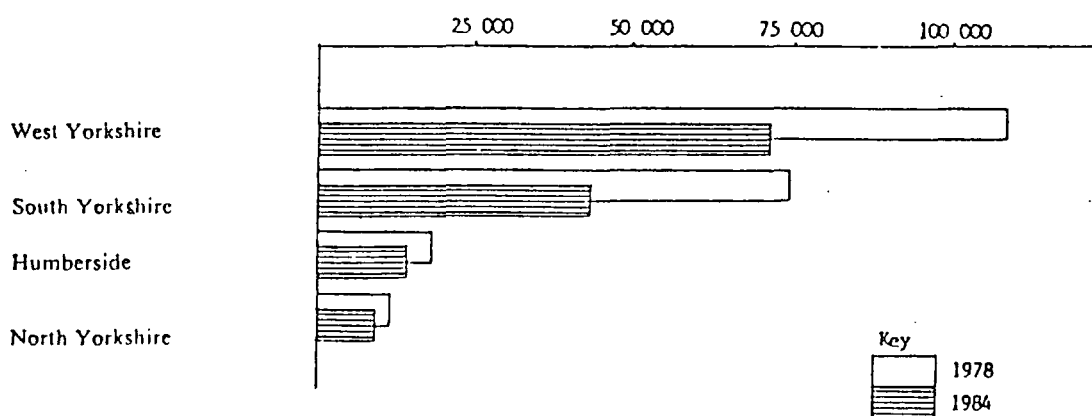
The coal mining industry is long established and based on an indigenous resource. Coal production in deep mines involves numerous communities. The same can not be said of the nuclear industry, a highly capital-intensive industry involving fewer direct employees and a relatively small number of sites and communities. Although the nuclear industry does provide work for many British engineering firms, the capital goods supply infrastructure is not as broadly based and probably involves far fewer employees than that built around the coal industry (see Appendices).

Source : Dewhirst and Gladstone (1988)

FIGURE 6:9

Engineering by county, 1978 and 1984

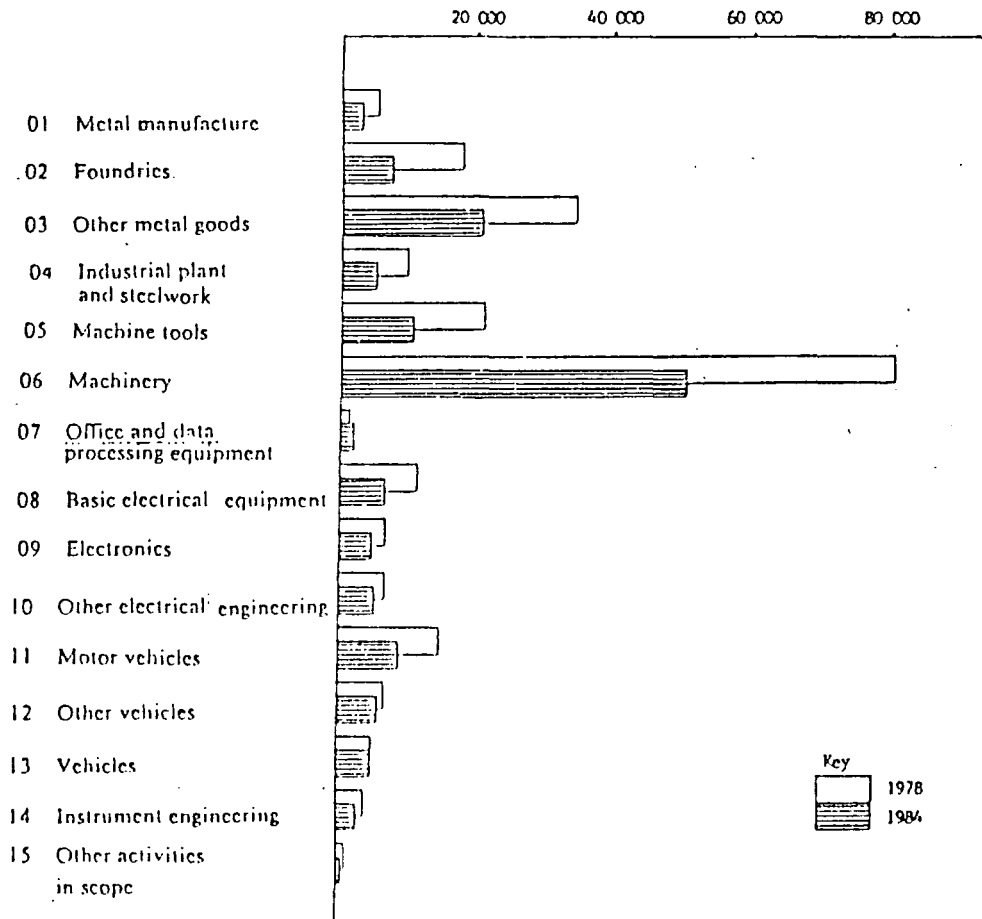
West Yorkshire has the largest number of engineering employees in the region, followed by South Yorkshire. Employment in the engineering industry in each county in 1978 and 1984



Source: EITB statutory returns

FIGURE 6:10

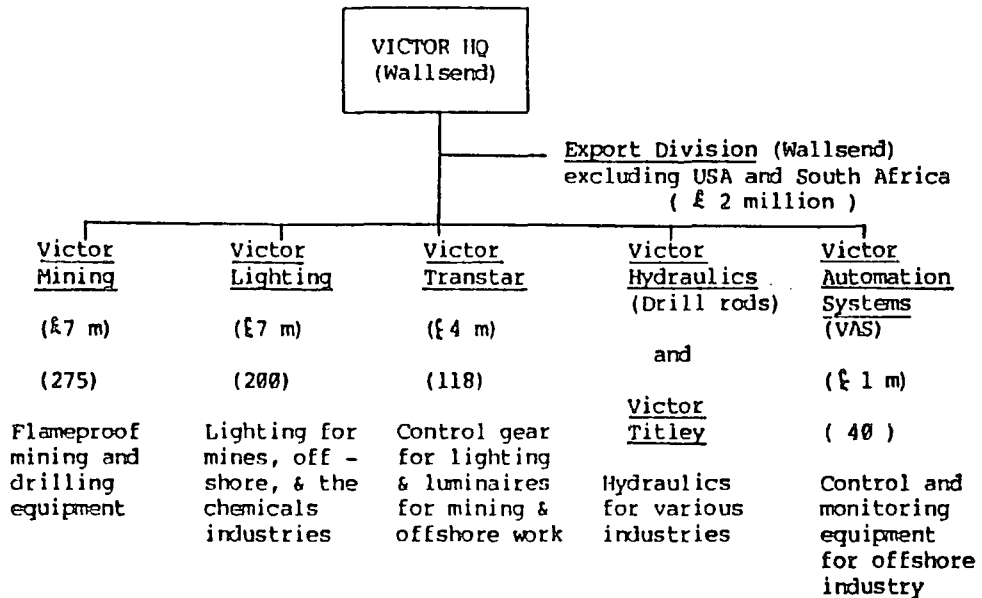
Employment by engineering sectors in Yorkshire & Humberside,
April 1978 and April 1984



Source: EITB statutory returns

FIGURE 6:11

Company Profile of Victor Products, 1985



Overseas subsidiaries, manufacturing,
and sales and marketing units

SOUTH AFRICA----- Victor Industrial Equipment
(£ 2m) (40)

U S A -----Victor Products (USA) Inc.
(£ 1.5m) (6)

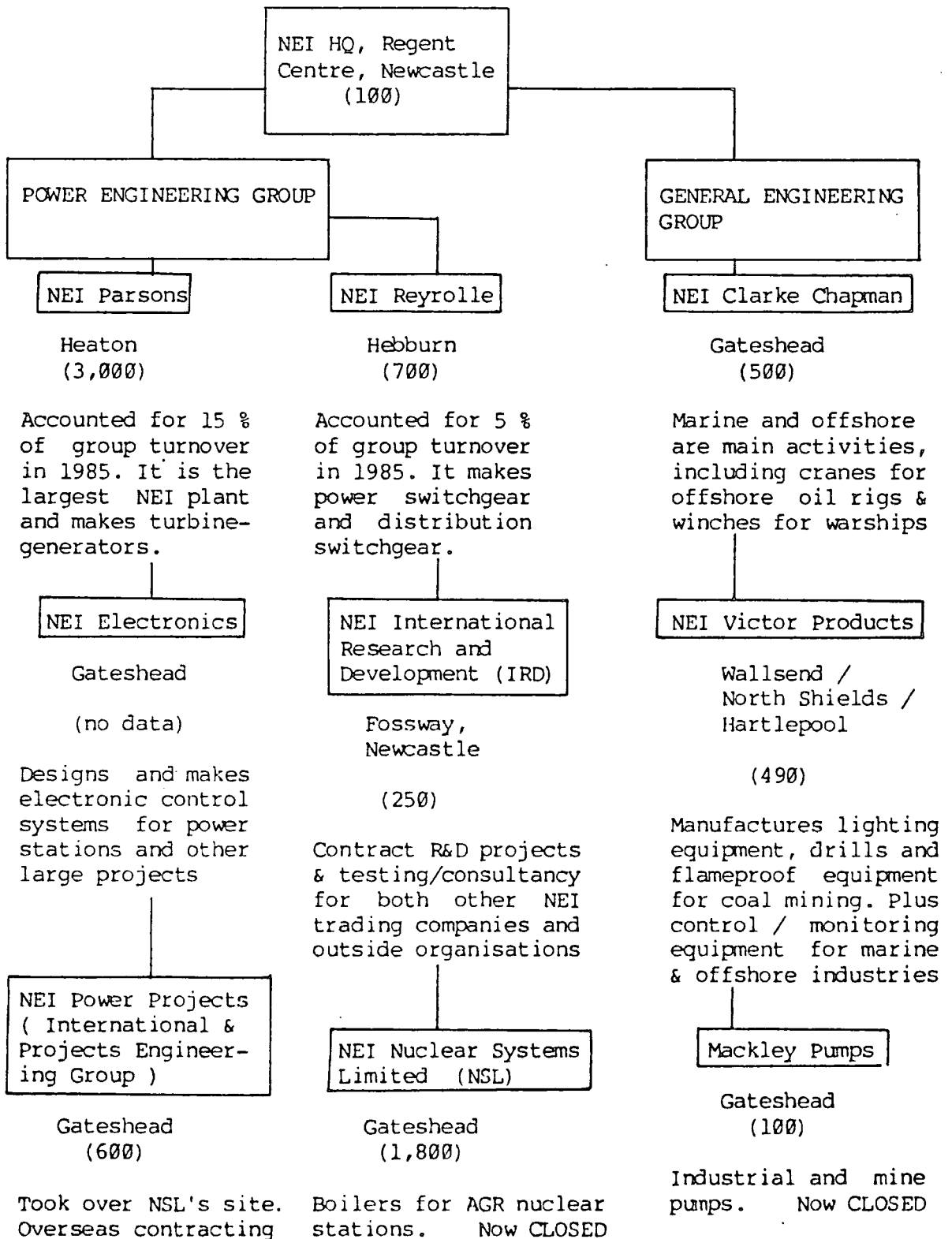
Notes: Annual turnover is given in £ million and employment figures are in brackets.

Victor Products was taken over by Northern Engineering Industries (NEI) in 1988. The merger of the hydraulics division and Titley operations took place during the 1984/5 miners' strike. Victor also bought Ridwest Engineering Company, which makes micro-processors. Ridwest formerly supplied mainly the marine and the horticultural industries, but since the Victor takeover it also supplied goods for the mining industry. For other changes since 1985 refer to the text.

Sources: Victor Annual Reports and author's survey.

FIGURE 6:12

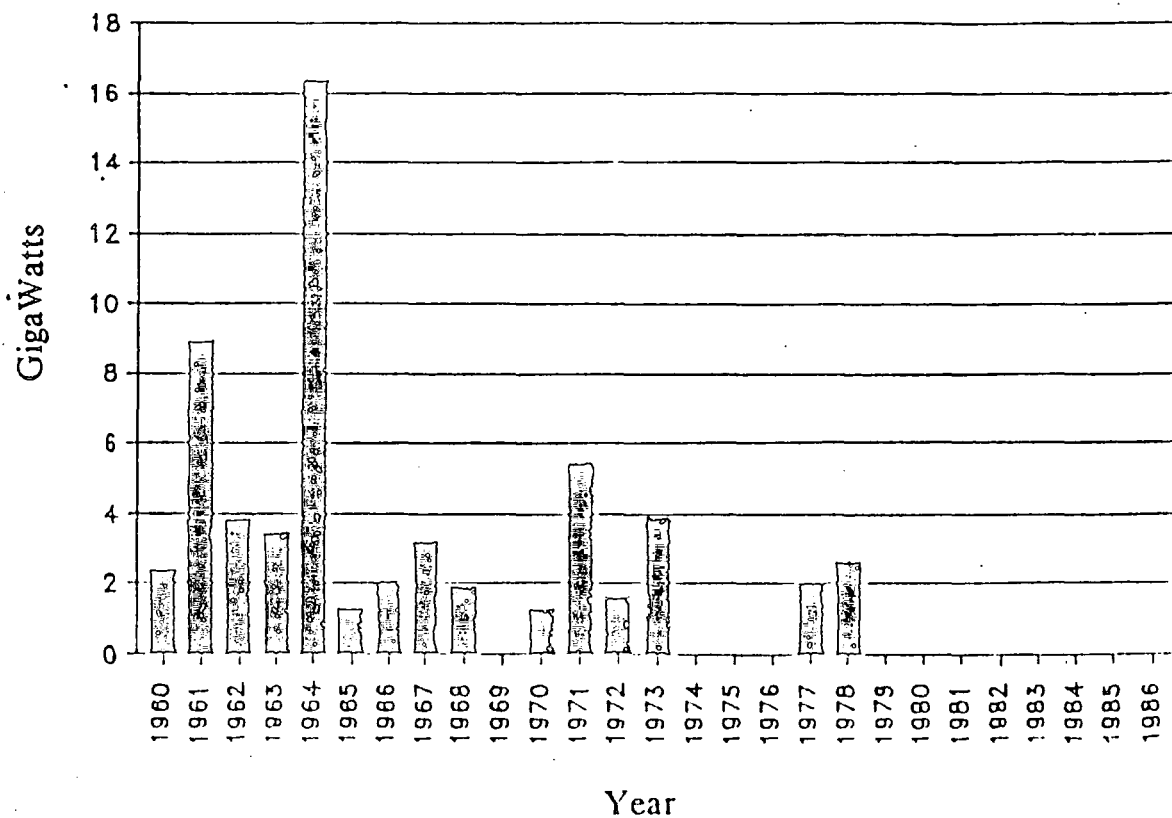
NEI in the North East of England



Sources: NEI and TUSIU

FIGURE 6:13

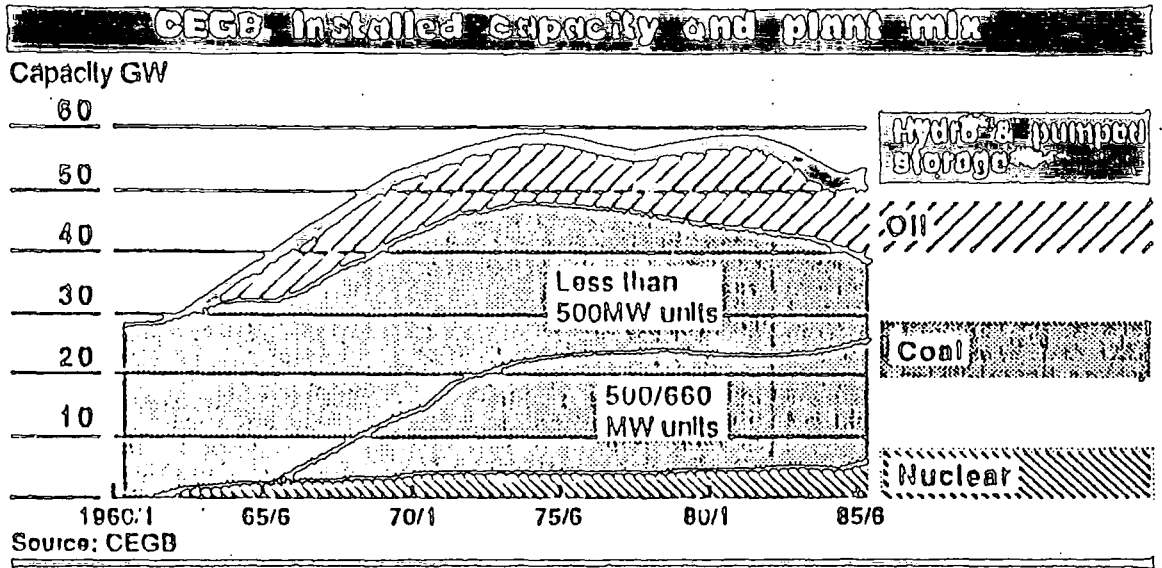
HOME ORDERS FOR TURBINES
British turbine - generator manufacturers 1960-86



Source CEGB and 1960-76 CPRS Report

Taken from District Councils in Tyne & Wear and NE1
Tyneside Trade Unions (1986)

FIGURE 6:14

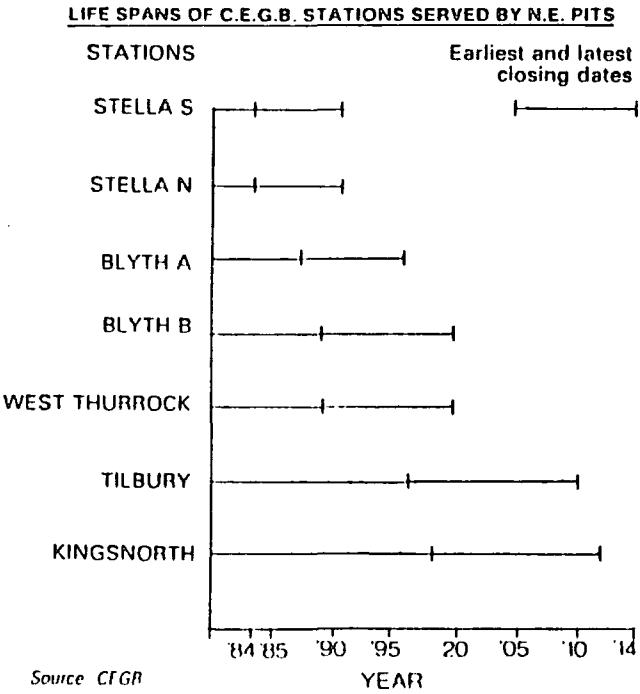
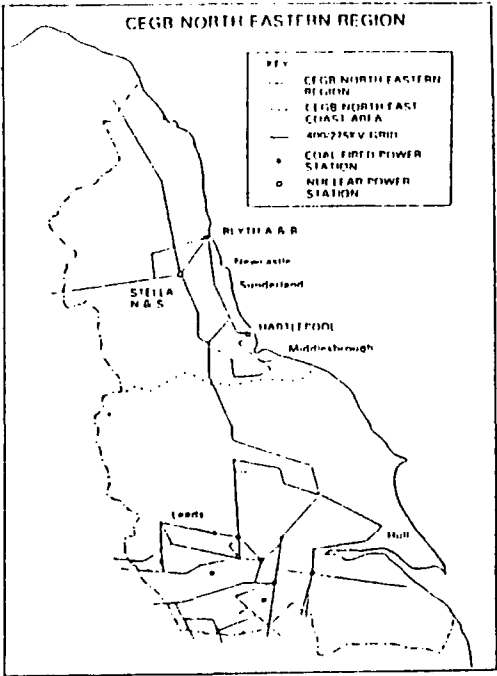


C.E.G.B. Capacity and Power
Stations by Fuel, 1985-86.

Station Type	Declared net capability MW/so	No. of stations
Coal-fired	12,556	40
Coal / gas-fired	366	1
Coal / oil-fired	1,920	1
Oil-fired	7,120	8
Nuclear	5,029	10
Gas-turbine	1 400	10
Hydro	112	7
Pumped-storage	2,018	2
Auxiliary gas-turbines	1,510	-
Total	52,101	79

Source: C.E.G.B. Statistical Yearbook (1985-86)

FIGURE 6:15
CEGB North Eastern Region and Power Stations
served by North East coal



Taken from TUSIU (1987)

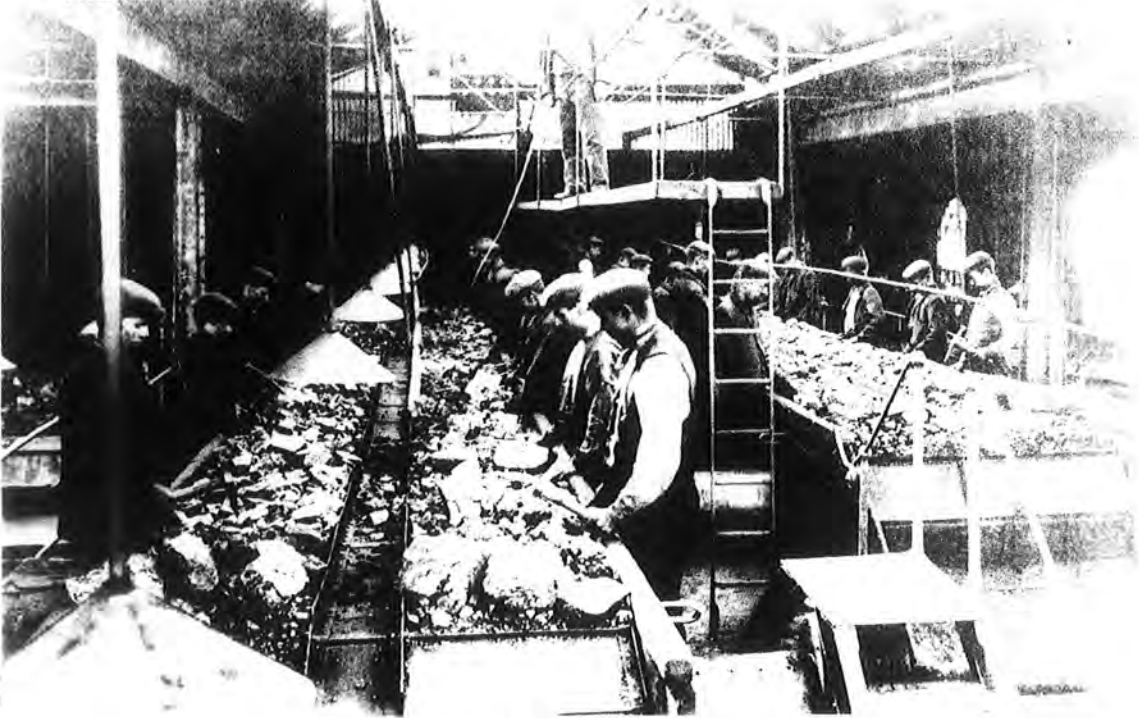
PHOTOGRAPH SECTION

Photo 1



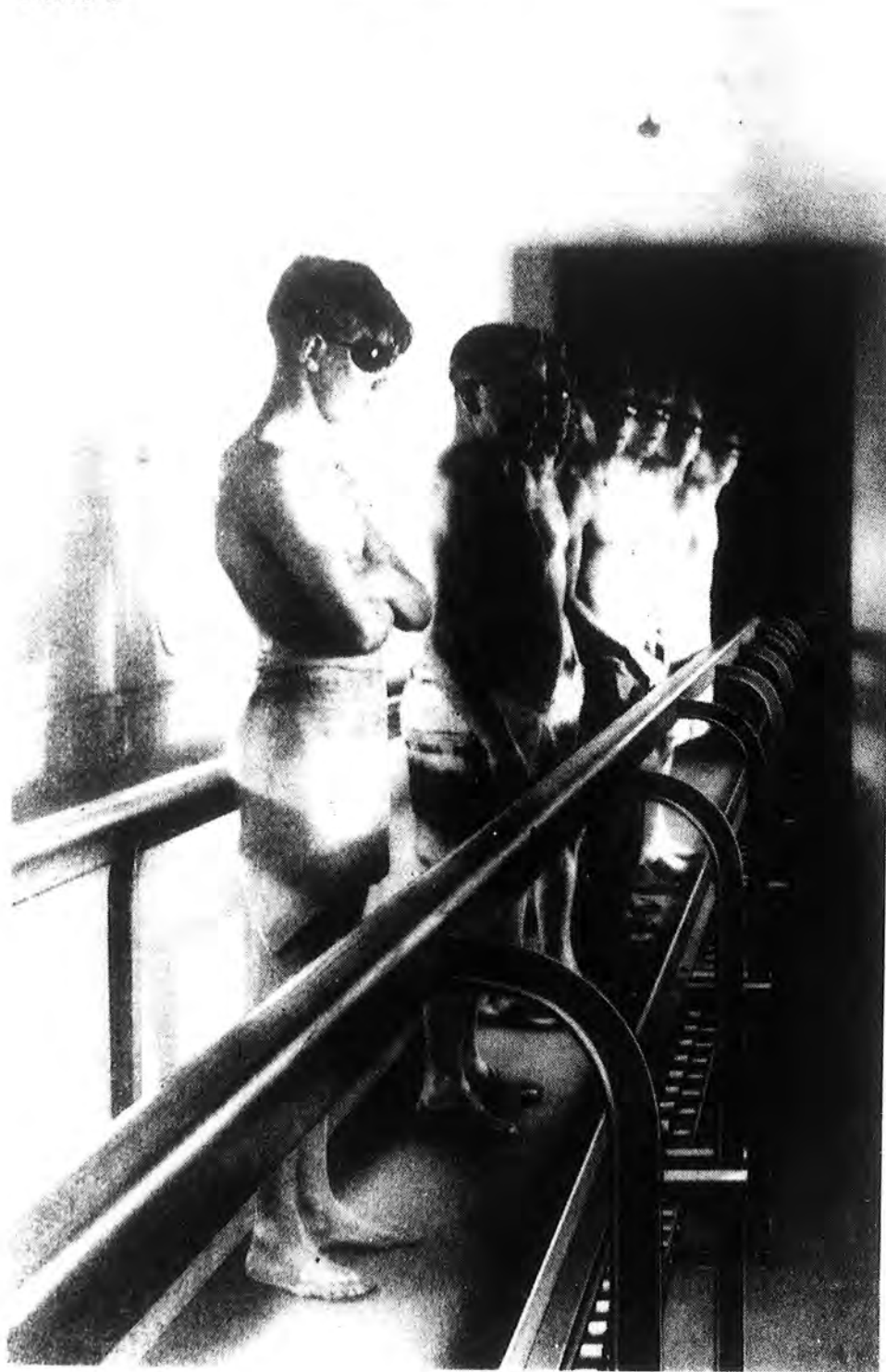
A pony pulling tubs full of coal. This was then most common form of underground haulage in British mines right up to the 1930s. Even after nationalisation there were still many pit ponies working underground. The boy in this picture is probably no more than 12 years of age, and was one of the many thousands who worked in the mining industry in the early 1900s. During the early 19th century boys younger than ten years of age worked as "trappers", minding underground trap doors for long periods, sometimes for days on end. Many lost their lives in pit explosions.

Photo 2



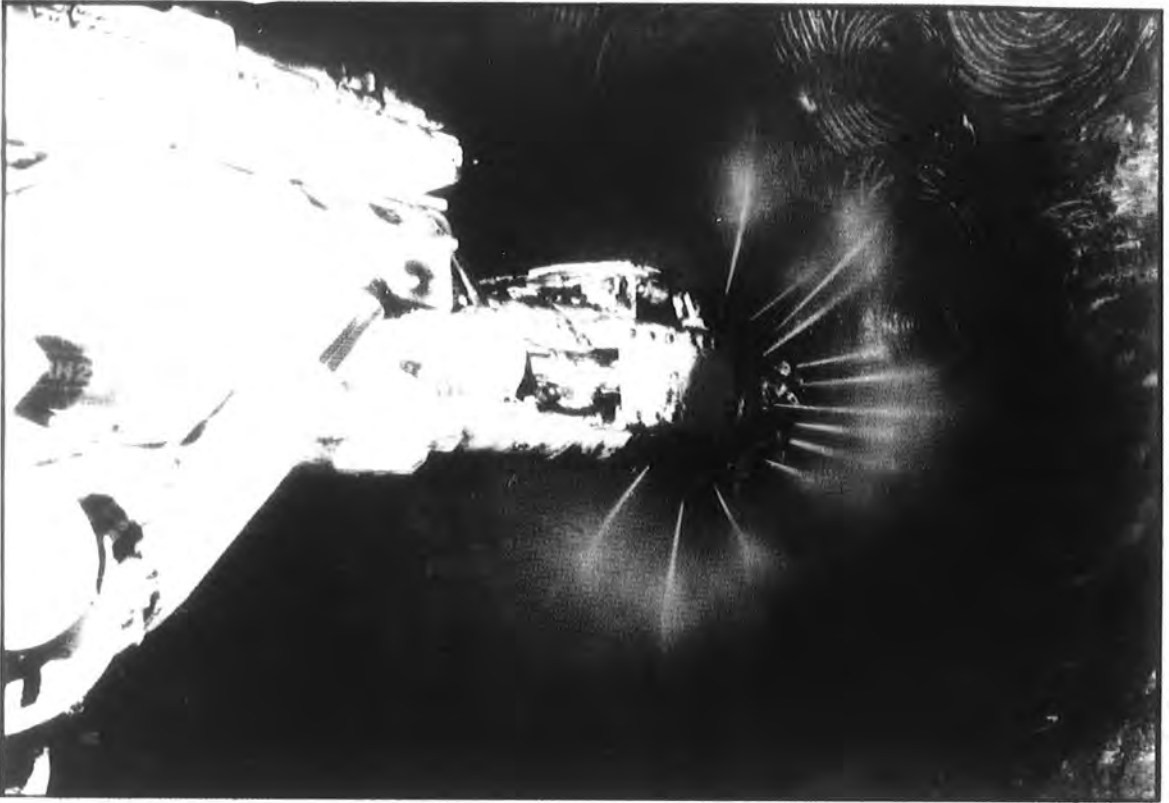
Sorting, breaking and grading coal used to be a very labour intensive process. This photo was taken in the early 1900s. At that time many women were also employed on surface work at collieries. Legislative reforms prohibited the use of children and female labour underground. Women workers at colliery washeries became known as "pit brow lasses". Nationalisation brought mechanisation of their work which involved separating dirt — slate — from the coal before sale. But the jobs in the new mechanised washeries went not to the women they displaced but to men (see Campbell, 1984: 100). Nowadays, coal preparation plants are highly automated, so they employ few men or women.

Photo 3



Not all machinery delivered to collieries has been in connection with the production or coal preparation processes. The conveyor in the picture was delivered by Meco for use in a solarium for miners at Manvers Main Colliery, Yorkshire.

*Photo courtesy of Dowty Meco.
From House RM & Harley FH,
'History of the Mining Engineering Company
Limited, 1909-1959.'*



This is a modern roadheader at work excavating strata in the development of a roadway for a longwall coal mine. The machine has a telescopic boom and high pressure water jets help to suppress the high quantities of fine dust produced by the cutting action. This particular machine is an RH22 built by Anderson Strathclyde.

Photo 5



Roof supports on the Gullick Dobson assembly line. The company has a long-standing policy of trying to maximise in-house manufacture. The main plant at Wigan consists of production facilities for the manufacture of hydraulic components and sub-assemblies prior to final assembly elsewhere on site. In 1986 Gullick employed around 1500 people at its Wigan works, which makes it the most important single engineering employer in the local labour market. In total, the UK mining machinery industry supplying underground equipment probably employs some 25,000 people if sub-contractors and secondary suppliers are included.

Photo 6



Shows part of the annual procession of people from local mining communities in the Durham Miners' Gala. Since the 1984-5 miners' strike the miners' support groups have been much in evidence, and they are a symbol of the traditional solidarity within individual coalfield communities as well as of the current state of the industry. Like the 1960s, the 1980s have been years of capacity cut backs and many pit closures. Since 1978/79 some 130 collieries have closed and around 120,000 mining jobs have been shed. Now whole coalfields are threatened with the closure of their remaining deep mines. These are in Scotland, South Wales, North East England and Kent.

Photo: R. Stone, July 1987

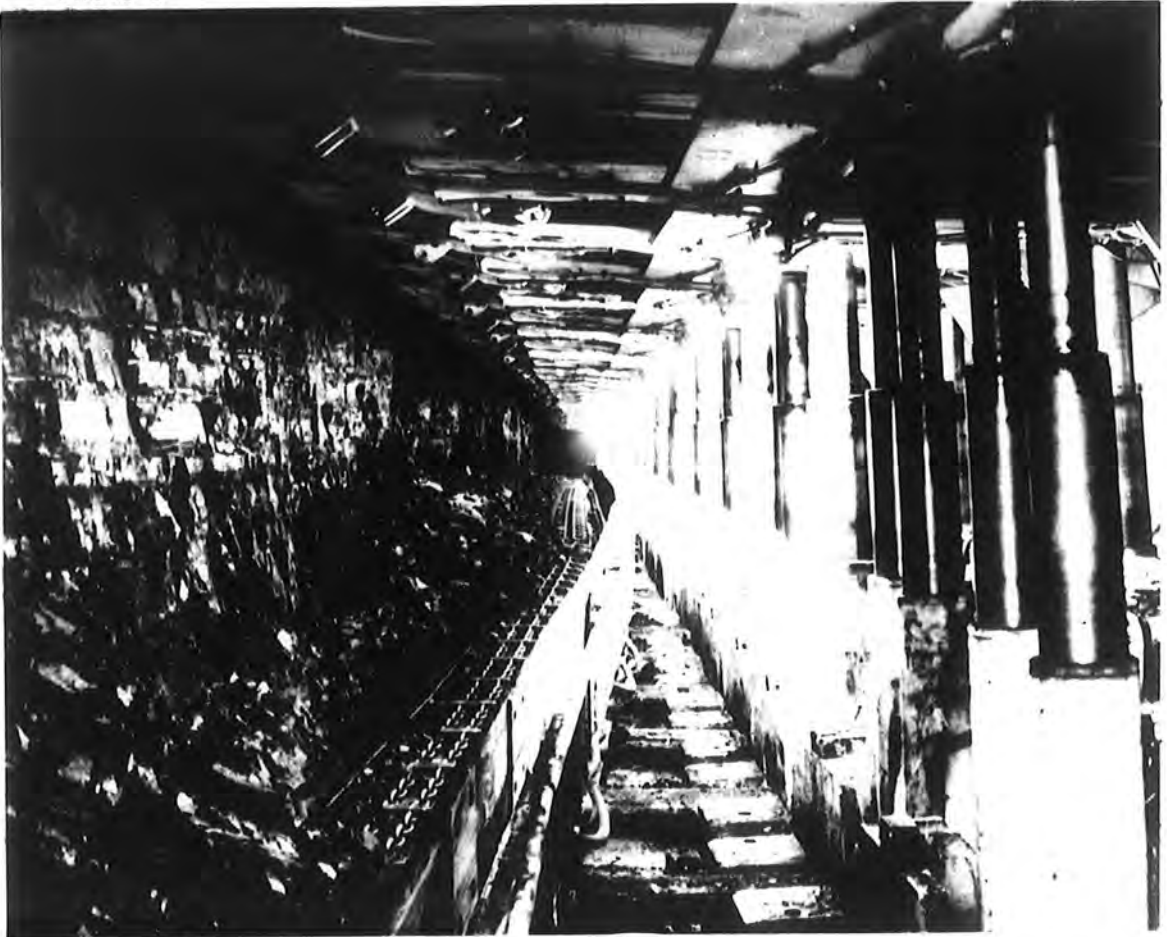
Photo 7



Pits in many European coalfields have closed and other mining jobs have been shed as a result of the introduction of new technology similar to that introduced by British Coal. This photo shows Belgium miners protesting in the streets of Brussels against job losses.

Photo: The Independent, 27 March 87.

Photo 8



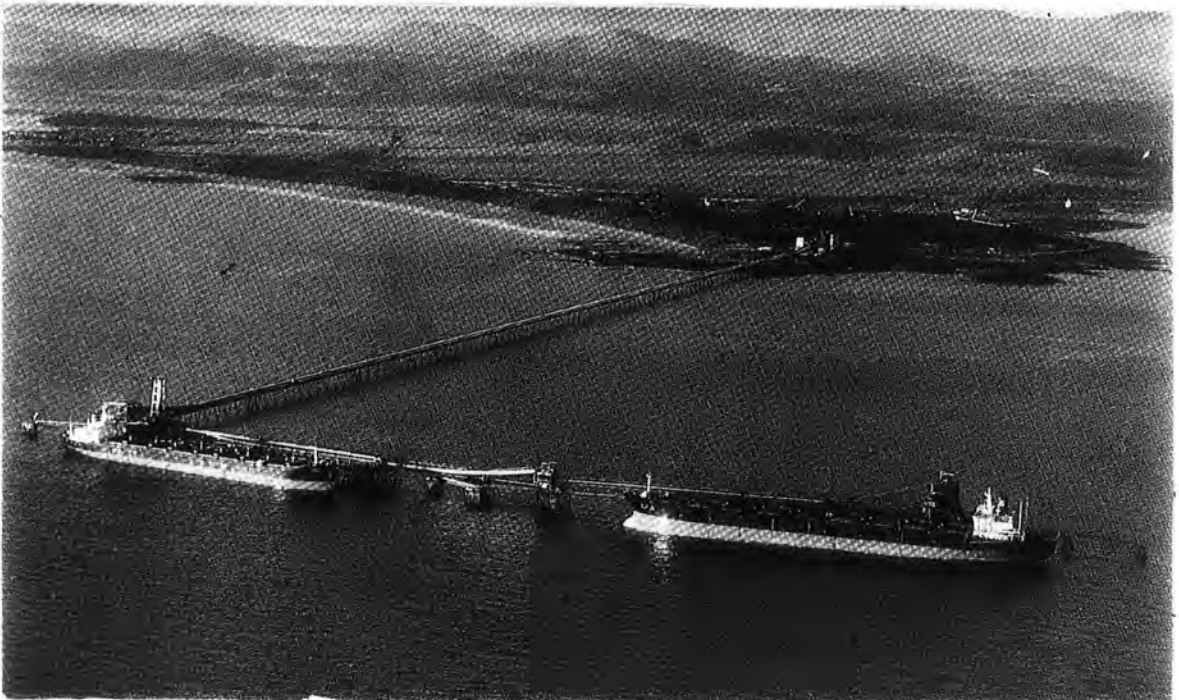
Shows a Dowty longwall system installed at a mine in New South Wales, Australia. Dowty's mining equipment subsidiaries export 50 per cent of their output and have their own manufacturing facilities overseas, including Dowty Wolleng and Dowty McCallum, Australia.

Photo 9



A 1,000 tonnes per hour Waste Disposal System for mine waste employed on an opencast site.

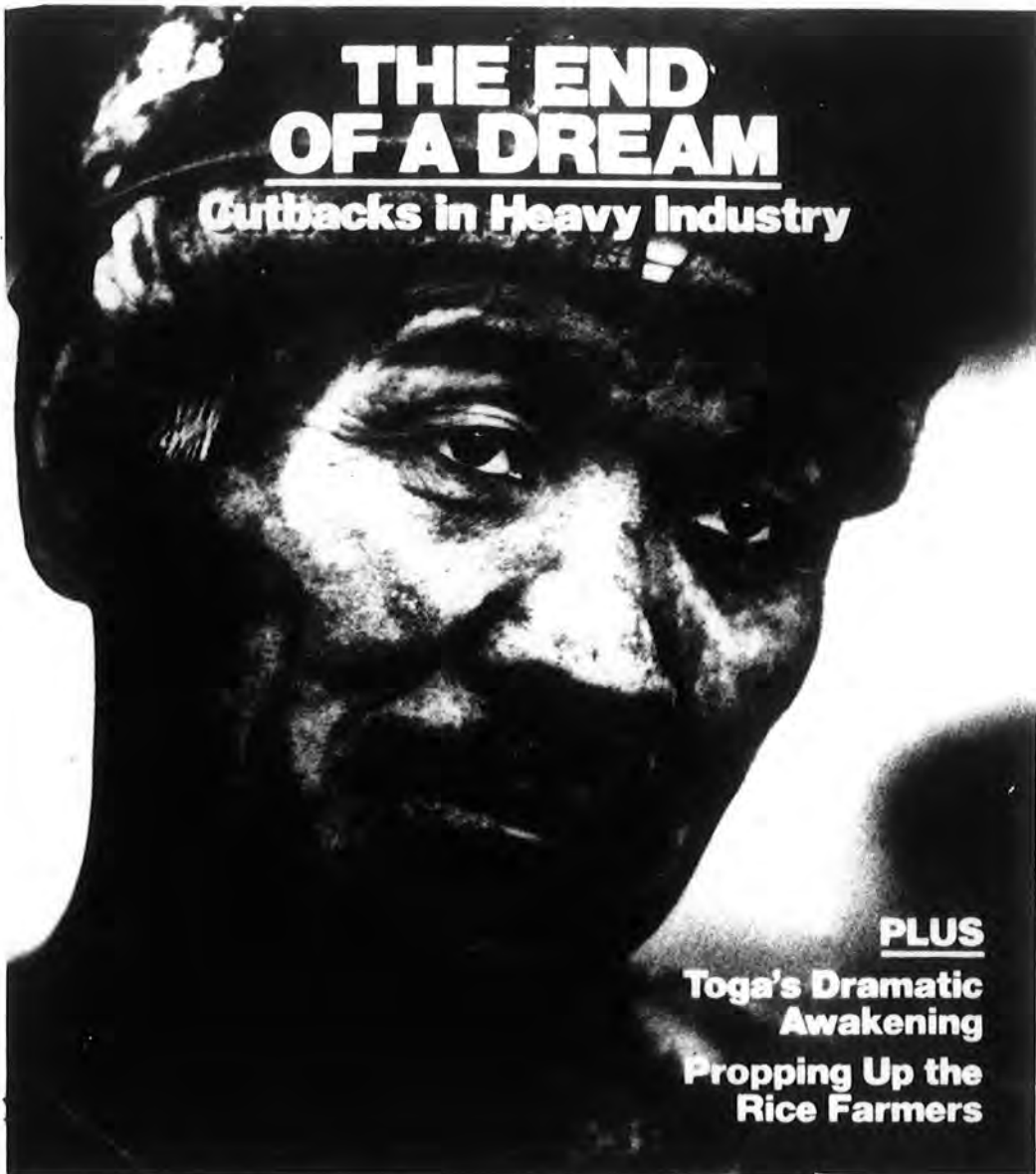
Photo 10



Hay Point, Australia's largest coal export terminal is designed to despatch up to 20 million tonnes of coal each year to overseas markets. Hay Point is one of a string of coal export terminals along Australia's east coast. In 1984-85 coal exports totalled more than 84 million tonnes, or 71 per cent of the saleable, processed product. Japan was the major buyer, receiving 52 per cent, followed by Europe (23 per cent). Coal imports into the UK following electricity privatisation are the biggest threat to the British deep mining industry unless corrective action is taken by the Government. Countries like Australia, China, South Africa, new Latin American producers, and the USA have massive coal export potential. The Australian Coal Association has predicted that by the year 2000 Australia alone could be exporting some 200 million tonnes per year.

Photo courtesy of the Australian Coal Association

Photo 11



Shows the face of a Japanese miner. Japan's coal industry in the 1960s employed 231,000 miners producing 16 m.t. of coal. Many of the pit closures have been in regions such as Hokkaido and Kyushu where there is little or no other form or primary employment. As in Britain, the social costs of coal industry restructuring have been enormous. The Government has paid out about Yen 1 trillion in social security benefits to ex-miners over the last 20 years, which is equivalent to the amount it has spent to keep deep mines open by direct subsidies. In Chikuhō, northern Kyūshū, some ¥70 bn annually are spent on regional development and rehabilitation projects, but most ex-miners are still unemployed. Japan's eighth coal policy covers the period until 1991, by which time it is planned that Japan will have only five to six working mines producing 10 m.t. Foreign coal suppliers, particularly the U S and Australia hope to improve their market share.

Photo PHP Interset, December 1987

Photo 12



This photograph shows British Nuclear Fuel's reprocessing plant at Sellafield (Windscale), taken from a local grave yard. The plant reprocesses thousands of tons of spent nuclear fuel each year from the UK and other nuclear power countries. It lies at the hub of the UK's civil (and military) nuclear programmes. The reprocessing business produces large amounts of highly toxic nuclear waste, which is dumped or stored, pending a more satisfactory solution. The plant has been the centre of controversy following a series of radioactive leaks and the dumping of quantities of nuclear waste into the Irish Sea. Work is currently underway on the thermal oxide reprocessing plant (Thorp), which will take in Advanced Gas-cooled Reactor (AGR) fuel from "Britain's latest 'family' of nuclear power stations, and Pressurized Water Reactor (PWR) fuel. This will make Britain the centre of the international trade in nuclear waste.

Photo by Don McPhee, courtesy of The Guardian and Manchester Evening News

CHAPTER SEVEN

INTERNATIONAL MARKET FORCES AND PRIVATE SECTOR MINING IN BRITAIN

(Opencasting, multinationals, engineering linkages
and coalfield communities)

'What is extremely depressing for the energy decision making of the UK is the shallowness of the knowledge about the nature of this market (ie the international seaborne coal market) among those very politicians and officials which have the fate of the British Coal resource in their hands. This, combined with the reluctance to improve their knowledge, is dangerously juxtaposed by a broad government view that British Coal should survive or perish according to the dictate of the market place' (Prior and McCloskey, 1988:71).

'The new breed of coal entrepreneurs may not on their own threaten British Coal's hegemony : at the moment their empire is tiny ... But they are in the business because they are aware that the logic of Thatcherism means the certain eventual privatisation of an industry that continues to dwindle like ice under a hot sun'. This quotation is drawn from an article that appeared in Inter City (July 1988:25), the magazine of another state owned corporation, British Rail, which like British Coal is being seriously considered for privatisation.

Many studies of the British coal industry, or of particular aspects of it, have tended to adopt too narrow a focus by concentrating too heavily on what is happening inside the industry and not enough on processes at work outside the industry but crucial to what is happening inside it. One of the aims of this thesis is to broaden the debate about the industry's future by analysing the many engineering linkages with the coal chain. Hitherto, the analysis has been very parochial. It has examined the industrial structure of the engineering industry associated with deep mining in Britain, and it has tried to show the

development of inter-capital relations between the state monopoly producer, British Coal, and its various equipment suppliers in the private sector (Chapter Five). It has also examined some of the multiplier linkage effects the restructuring of British Coal is having on Britain's engineering sector (Chapter Six).

This chapter adopts a broader perspective. Whilst it is primarily concerned with the the UK opencast mining industry and its machinery suppliers, it widens the analysis away from its preoccupation with purely British events. This is necessary owing to a variety of government policies relating to the electricity supply industry and coal mining and aimed at expanding the influence of private capital in those industries. The government is also attempting to "liberalise" internal energy markets. This may transform Britain from a net exporter of fuels into a net importer by the mid-1990s. The privatisation of the power supply industry and partial (or "back door") privatisation of the coal industry before 1992 are likely to increase the involvement of international capital within the national energy sector. Furthermore, there will be increasing competitive pressures on British Coal to reduce its costs further by expanding opencast mining and by closing down the ever-present "high cost tail" of a rapidly diminishing body of collieries.

Put simply, the British government has set in motion policies and a whole range of forces that will undoubtedly alter the structure of the UK energy sector beyond recognition by the mid-1990s. A new power structure is taking shape in Britain's energy industries as various corporations and private consortia manoeuvre to take advantage of the "liberalised" and privatised home market. As one central theme of this

thesis is an examination of public-private sector relations and boundaries in the coal industry, a major aim of this chapter is to examine the ways in which current policies are likely to change these relations, and to assess who will be the main beneficiaries of current state policies. Some assessment of the likely linkage multipliers of both an expansion of opencasting and greater coal importation is needed. This can only be done by understanding something of the nature of the international seaborne coal trade and world markets for coal and mining machinery.

Two crucial concerns underlie most of the analysis in this chapter. Firstly, it seems that current policies are being pushed through with too little consideration of numerous direct and indirect social and economic consequences, particularly for the people most adversely affected, including coalfield communities and the workers in the coal supply sectors. Secondly, these policies are taking place in the absence of a coherent national energy policy and too little thought for long term energy consequences.

7.1 "Market Forces" and the changing role of opencast mining in Britain

Figure 7:1 shows the geographical extent of shallow coalfields in Britain. There is certainly potential for existing opencast operators to increase the number of working open pits and tonnage levels. Indeed the 1980s have witnessed an increase in the level of planning applications for new sites. The opencast fraternity have been in an expansionist mood due mainly to the encouragement and support of the

government. The simple fact is that the industry is regarded by Conservative Ministers, British Coal executives and many private mining operators as one of the most profitable sectors of the British economy. Indeed, in 1987/8 opencasting accounted for about 15 per cent of BC total coal production but 85 per cent of its profits. This fact alone has led a government keen to extend the influence of private capital in the public sector to change the role of opencast production vis-a-vis deep mining.

Prior to 1979, opencast coal output was regulated in line with that of deep mined coal and the total market demand for British produced coal. Opencast mining's main role was to supplement deep mined output. Surface mine output was deliberately regulated. In 1959 and again in 1968/9, opencast production was cut back to lessen the problems created by over-production at a time when the coal market was being eroded by cheap fuel imports and collieries were being forced to close.

Opencast output remained below ten per cent of total coal production, although there was a slight increase in the proportion of opencasting to deep mining. This was mainly the result of rapid and widespread pit closures rather than deliberate design. In 1960, opencast output was 7.7 million tonnes or just four per cent of total coal output, and by 1973 it had increased to around 8.5 mt or 7.8 per cent of the total. It was only after the OPEC oil price shocks of 1973/4 that Plan for Coal (NCB, 1974) projected an increase in opencast output by some six million tonnes to 15 mt by the mid-1980s. But this was within the overall context of a big projected increase in deep mined output to some 120 mt. Whilst the rise in opencasting has been

achieved more or less as anticipated, deep mining has borne the brunt of the decline in coal markets since 1979 and British Coal's deliberate measures to cut higher cost capacity. By 1985/6 opencast output had reached 14 mt or around 13 per cent of total output. In other words, opencast production has increased by two-thirds, whilst the total level of coal production is about 25 per cent lower than the 1974 forecasts. This has led some observers to argue that opencast mining in Britain has changed from a supplementary operation to deep mining into

'an alternative and competing source of supply within a static (or declining) market' (Beynon et.al., 1986:44).

The argument runs like this. Without an increase in the total market demand for British produced coal, any expansion in cheaper opencast output will create additional "surplus capacity" in the deep mining industry, which because of its very nature is a higher cost source of coal.

The NCB's (1985) New Strategy for Coal signalled a change in the Board's attitude towards opencast mining's role. The Coal Board argued that there is

'no advantage in reducing opencast output during the next few years to ease the balancing of supply and demand for deep mined output'.

In 1987/8, some 15 mt of coal was produced on sites under the auspices of BC's Opencast Executive (OCE) and Scottish division which supervises sites north of the border (see Table 7.1). The Corporation has already indicated that it sees 18 mt as a reasonable short term target (ie by

the early 1990s), but the ultimate target could be even higher. The possible consequences of a "liberalisation" of the private coal sector was indicated in a City stockbroker's report that suggested deep mine output would fall to 45 mt a year and opencast output would increase to 25 mt by the mid-1990s (Kleinwort Grieveson Securities, 1988).

It is worth considering why it is that British coal has transformed opencast mining from a marginal contributor to total output into a source of increasing significance in terms of tonnage. Undoubtedly, the state has played a decisive part in redefining the role of opencasting within Britain. Since 1979, successive Conservative governments have sought to introduce new legislation that encourages more opencast production (and profits) both within and outside the public sector. The 1983 White Paper, Coal and the Environment, abandoned the national target of 15 mt of 1974. Instead the government stressed that,

'the appropriate level of opencast output should be determined by the market subject to the acceptability of individual projects as determined through the planning system' (HMSO, Cmd. 8877, para. 74:25).

In so doing, the government accepted the principle of the transfer of responsibility for determining NCB opencast applications to the Mineral Planning Authorities, usually part of county councils, as suggested by the Commission on Energy and the Environment (the "Flowers" Commission) in 1981. But the government specifically rejected other crucial recommendations of the Flowers' report, especially the notion that as older, unprofitable deep-mines are phased out and their productive capacity replaced by new, efficient collieries, the level of opencast

production should be allowed to decline. Furthermore, it abandoned any idea of a maximum national output quota on either deep or open pit coal, and argued that "market forces" should determine the level of opencast production. Private operators and the OCE were to justify their proposals for new open pits through the planning system on a case-by-case basis. Subsequent Department of the Environment (DoE) circulars have emphasized that it is not the state's role to interfere in the market, and it is up to British Coal to set national and regional targets for opencast output based on the corporation's perception of "the market requirement" for coal.

The government has repeatedly stated that its own role is to help create the conditions necessary for the free operation of the market and to facilitate the profitable expansion of private capital. From this perspective the main objective of energy policy is to ensure adequate and secure energy supplies at the lowest practicable cost to the nation. The government has argued that it will not interfere in the industry's own commercial judgements on how best to meet "market needs", either by deciding upon the appropriate mix of deep mined and opencast coal, and/or by balancing opencast output between coalfields. Contrary to the government's rhetoric it has in fact greatly interfered in the production decisions of public sector energy corporations by changing the parameters within which these decisions are made. Financial break even targets on British Coal have placed short term profitability criteria ahead of long term production planning and resource management.

To become more profitable BC management have sought to maximise output from existing opencast sites and to increase the number of

sites. In the face of strong opposition from some local authorities and environmental pressure groups, such as the Council for the Protection of Rural England (CPRE), BC has put forward several arguments to justify its policies. It has stated that cheap opencast coal helps subsidize the total operations of the organisation, and by implication, it subsidizes deep mining. Furthermore, BC argues that some deep mines rely on a supply of opencast coal to provide an overall coal quality acceptable to customers.

BC's arguments that opencasting subsidizes deep mines have already been questioned in detail (Coalfield Communities Campaign Working Party on Opencast Coal, 1987). They are not convincing at a time of world over-capacity in coal markets and when the future level of British Coal production is very uncertain owing to the threat of cheap imports, the privatisation of the electricity supply industry, and the state's pro-nuclear stance (see Chapter four). Without significant changes in government policies towards energy, deep mined output is likely to fall to lower and lower levels in the 1990s. The commissioning of the last of Britain's "family" of Advanced Gas cooled Reactors (AGRs) probably displaces between 12-15 million tonnes of deep mined coal from the electricity market. Added to this there are some five million tonnes of deep coal displaced by surplus electricity from French nuclear sources via the 2500 MW Cross-Channel Link. Private consortia interests considering building and operating power stations and the electricity boards have given strong indications that they intend to import more coal. Furthermore, there are government proposals for allowing in imported gas from Norway, and there is a definite likelihood that private power companies will invest in gas-fired combined-cycle power plants to diversify their fuel base, BC sells

around 80 per cent of its coal to power stations. Any increases BC can achieve in sales to the industrial, commercial and domestic coal markets would not be sufficient to compensate for large losses in demand from the UK electricity supply industry.

Opencast coal is primarily destined for the same bulk market as deep mined coal - ie power stations (see Figure 7:2). The hard energy market realities outlined above make a nonsense of BC's claims that further expansions of opencast mining will benefit deep mining. Whilst it is undeniable that opencast output supports a proportion of jobs in BC's deep mines by allowing blending with coal which would otherwise not be saleable. In practice, the proportion of opencast coal required to "sweeten" deep mined coal for power stations is probably between five to ten million tonnes, or about a half to two-thirds of current production (CCC, 1987).

The bottom line - Profits

The bottom line is that opencast coal production is very profitable compared with deep mining and BC is keen to improve its financial worthiness to the government. Table 7:2 gives details of the operating profits made by opencast mining in different years. In 1986/7, BC's opencast sites made operating profits of £244 million, which out-distanced the operating profits of deep mining, some £41 million from almost four fifths of total production. The following financial year, deep mining made losses of £100 million whilst the opencast mines turned in an operating profit of £252 million. Add in the profits made from asset sales and non-mining activities then BC made an overall operating profit of £216 million (1).

Market demand or need, narrowly based on lowest practicable cost criteria, is easy for BC's OCE and private contractors to prove. Production costs for opencasting are substantially below those of virtually all deep mines (Table 7:3). The reasons for this lie in the methods used to extract surface coal (see Figure 7:3). Modern mechanical digging, scraping and scooping machines are able to obtain coal deep under the earth's crust. Deep mining involves sinking deep shafts and cutting long tunnels, often extending miles from the shaft bottom. The consequent geological-cum-production difficulties are much greater than for open-casting. Underground mines involve costly health and safety measures such as ventilation shafts, intricately safe and flameproof equipment, dust extraction equipment, etc. Whilst opencast sites in Britain also have to comply with many environmental, health and safety regulations, they are cheaper to apply on the surface than deep underground (2). Put simply, before any coal can be won from deep mines £ millions of fixed capital investment is needed. Of course, opencast sites are capital intensive requiring heavy extraction machinery, which is not cheap, but the time lag between initial capital investment and the returns on the investment can be a matter of months once planning permission is granted. In contrast, the time lag can be as long as ten to fifteen years for many deep mines before any reasonable returns on capital expenditure are realized. Thus, opencast mining offers attractive and quick profits for BC and private operators.

Opencasting is also less labour intensive than deep mining so labour costs are lower. Surface mines employ, on average, three to four times fewer people per tonne than deep mines. Output per manshift from UK opencast sites is around 13 tonnes which is over half that of

deep mines. On large surface mines in Australia and the USA OMS averages around 30 tonnes (3). Only a small direct labour force is employed by the OCE for inspecting and sampling coal won, which, together with the administrative resources required to identify, plan and manage opencast sites, must be regarded as fixed in the short term irrespective of output levels. Over 90 per cent of employees involved in BC's OCE supervised operations are paid by the contracting companies (see Table 7:4 and 7:5).

The civil engineering industry and its labour force are well versed in the field of short-term employment contracts which attract relatively high wages but smaller termination benefits than colliery employees. Most of the workers on open pits have had more experience in the construction industry than in mining. For the government the fact that opencast sites employ contract labour for short periods gives it an added political significance. The continued extension of opencast mining would reduce the political leverage of the deep mining unions, particularly the NUM and Pit Deputies' union, NACODS, which continue to resist BC's plans for more flexible working practices and six day working. The main union representing construction workers is the Transport & General (T&GWU).

For British Coal's OCE there are many economic advantages in contracting out to private civil engineering companies whilst keeping sites under its overall control. Opencasting is effectively a private enclave within a nationalised industry. Unlike deep mining, British Coal does not directly operate coal production from its sites. Firstly, private contractors are responsible for actual operations, but they are licenced and supervised by the OCE. Secondly, British Coal

purchases very few items of plant for opencast mining. It does own some large items such as draglines which can cost as much as £18-20 million each. Owing to the short life of a single site, the Corporation identifies two or three sites for which a dragline will be required and builds the use of the machine into the tender documents for the contracts in question. Such arrangements only apply for very large items owned by BC. Most items - dump trucks, hydraulic shovels, rope shovels, wheeled front end loaders - are financed by the contractors themselves. As Prior and McCloskey (1988:58) observed, such an arrangement carries enormous financial benefits for BC.

'the investment required in large equipment is carried by the contractors. In a period when BC is being squeezed by very severe limits on their external borrowing, such a positive, internal cash flow is a veritable lifebelt. It is, effectively, equivalent to putting the development of the Selby complex to private contractors and levying a per tonne profit on the coal produced.'

All sites for which the Corporation applies are worked under contract, in most cases let to the least expensive of six to a dozen civil engineering contractors invited to tender. Coal won under contract is delivered to a central plant or disposal point for preparation and sale. The coal is then marketed as part of the overall availability from the nationalised element of the industry. The typical opencast site requires the removal of some 20 cubic metres (m³) of material for every one m³ of coal won, which requires efficient extraction, handling and storage of large volumes of soil, rock and other material. The contractor is obliged to submit a statement with his tender setting out the method and plant he proposes to deploy in working the site.

'Choice of equipment to work a particular site is crucial; the wrong choice can have unfortunate financial consequences for the contractor' (Kelly, 1987:143).

As a high percentage of the contract value is made up of payments in respect of coal won, delivered and weighed at the disposal point, it is up to the contractor to strike the right balance between plant and productivity, or between a substantial part of his fixed costs and profits on coal won.

For British Coal, well in excess of 80 per cent of opencast costs are variable with production, ie no output, no cost, by virtue of contractors being paid for coal won and delivered. Given that the level of output required to provide sufficient contribution to cover fixed and semi-fixed costs (such as operating preparation plants and exploration for future sites) is relatively low at around three million tonnes per annum for all OCE sites in England and Wales, contribution from any output above this level is pure profit.

Table 7:6 gives a breakdown of the 1986/7 operating results for BC's OCE. Such end-of-year results are the envy of private operators involved in BC contracts and those engaged in independent mining under licence from BC. As A.T.B. Shand, former President of the Federation of Civil Engineering Contractors (FCEC) and chief executive of Shand Mining, an opencast company, stated,

'... Years ago I said that the Managing Director of the Opencast Executive was the Managing Director of the most economically successful company in the country. I won't recite all the figures, like returns on investment and so on, but if you look at

the Report and Accounts they are all there. You can pick out these figures I have been talking about, and certainly the results are absolutely staggering. However, none of us on my side of the fence resent this. We are just proud of being part of a very successful joint enterprise' (Shand, 1980:33).

The economics of the industry make it one of the most lucrative businesses in the UK and are irresistible to a government keen to expound the virtues of the profit motive and create an "enterprise culture" in Britain. Expanding opencast mining is seen both as a way of improving BC's overall financial fitness for the industry's eventual flotation on the market, if the Conservatives are re-elected a fourth consecutive time, and as a way of increasing the role of private capital "within" the existing nationalised framework.

7.2 Partial privatisation and private mining

On 12 May 1988, Michael Spicer, junior energy minister, announced that the government has "ambitions" to privatise the coal industry following another General Election Victory, presumably around 1992. In the meantime, it was announced that the government intended "to create conditions for greater competition for both UK coal supply and the coal market" (The Guardian, 12-05-88:24). Earlier in the year, Spicer held talks with leaders of the T & GWU to discuss expanding opencast mining and so the number of T & G jobs in the industry. In March, Spicer held discussions with various City institutions over ways of selling off the coal industry. The minister was reported to be "very encouraged" by the "great deal of interest in financing and backing private initiatives if opportunities existed" (Sunday Times, 06-03-88).

As noted in earlier chapters, privatisation takes numerous forms and is well underway in the British Coal industry. Almost every major strand of corporate policy since the 1984/5 miners' strike can be related to the ultimate political goal of full privatisation. These include the selling off of profitable ancillary activities and increasing "contracting out" of former in house activities to private firms (see chapter three); the introduction of the quasi-competitive restraint of arbitrary financial break-even targets (chapter four and see O'Donnell, 1985); the adoption of American-style macho management methods, new "flexible working practices" and the growing influence of contract mining in the deep mining industry (see chapter five). They include the plethora of decentralised wage bargaining and productivity schemes which break up the national unity of the main mining union, the NUM, as well as the efforts to manage each BC area as a separate business and accounting unit following the recommendations of the Monopolies and Mergers Commission in 1983. To facilitate many of these measures, and further pit closures to boost short term profitability, the Coal Board, had to weaken the resolve and industrial muscle of the NUM (MacGregor, 1987). The formation of the breakway Union of Democratic Mineworkers (UDM) and victory over the miners in the national coal dispute were essential prerequisites for the fulfillment of the government's privatisation plans for coal and other energy industries (see Whitfield, 1985).

It is within the wider political context that plans to expand opencast mining in Britain should be analysed. In fact, according to one report by the Centre for Policy Studies advocating the early privatisation of the coal industry alongside that of the electricity supply industry, an expansion of opencasting is necessary in order to

attract sufficient interest from potential private investors (Robinson and Sykes, 1987). The report goes on to argue that British Coal should be sold off on an area-by-area basis with the opencast operations within the boundaries of each area considered as an integral part of their business activities, rather than selling the OCE off as a separate business and BC's deep mines off as a monolith.

'Since it is desirable to make it possible for all areas to be privatised speedily and to hold out the prospect of profitability for each one of them (without which private sector participation would not occur), it would appear sensible to allocate opencast operations to the relevant areas in the first phase of the privatisation exercise, and to study the question of management integration' (Ibid., 58).

(Table 7:7 is taken from the CPS report, and Table 7:8 shows the regional results of the OCE for 1986/7).

Private mining companies and big mining houses find surface mining the most lucrative method of extraction. So the government is keen to follow the advice of City financial analysts like Kleinwort Grieveson and expand opencast mining above current levels (4). This is one motive underlying recent attempts by the Department of the Environment (DoE) to change the planning criteria and influence the decision-making priorities of local mineral planning authorities. New DoE guidelines reemphasize the government's belief that,

'because opencast coal is one of the cheapest forms of energy available to this country, it is in the national interest to maximise production where that can be done in an environmentally acceptable way' (DoE, 1988:para. 5).

These guidelines make it very clear that only "overriding environmental considerations" should be allowed to prevent approval for new opencast sites. Even proposed sites within areas of outstanding natural beauty, including National Parks and Green Belts can be approved for opencast mining

'provided that high environmental standards are maintained and that the site is well restored' (Ibid., paras. 13-17).

In particular, the relevant mineral planning authority considering a proposal for a site within a local beauty spot should consider "the availability and cost of alternative sources of (fuel) supply" in their assessments. In other words, the "market requirement" for coal is being given as much prominence, if not more, as "environmental and other material considerations." The DoE (1988) guidelines make it increasingly difficult for planning permission to be refused by county councils. Even when they do reject proposals for specific sites they are now obliged to submit details of sites where opencasting is more likely to be acceptable within their region. Both the government and BC hope that the new guidelines will speed up the planning process and reduce the number of costly public inquiries. Whilst BC has claimed the level of planning approvals for new sites has dropped from 90 per cent to 22 per cent in the three financial years following the national coal dispute of 1984/5. This decrease in the rate of approvals should be considered within the overall context of a much higher level of new planning applications since that date (see Figure 7:4).

Current ministerial considerations include proposals to revise the 1946 Coal Industry Nationalisation Act which limits private deep mines

to only 30 employees working underground, and allows the nationalised coal corporation to control the number of private operations by requiring operators to hold a licence issued by BC. In addition, private mining companies have to pay royalties to BC as well as accept the selling prices imposed upon them by BC. Both the National Association of Licensed Opencast Operators (NALOO) and the Federation of Small Mines of Great Britain (FSMGB) have campaigned vigorously since 1979 to end British Coal's monopoly over the issuing of licences. They argue that BC should not be the custodian of the nation's unworked coal, and that control should be passed to the Department of Energy or to the Crown, whereby both BC and private operators have to pay royalties to work and mine coal, or the system could be replaced altogether by economic rents collected in the form of a corporation tax.

The government has already indicated that specific restraints on private mining outside British Coal operations will probably be lifted before the next General Election. These include an end to the 30 worker limit on private deep mines, and a removal of the 35,000 tonne upper reserve limit on single non-OCE or Scottish BC opencast sites and the 50,000 tonne maximum for adjacent sites. The proposed privatisation of the electricity supply industry will also end the Joint Understanding between the CEGB and BC, whereby the latter can only take five per cent of its coal (including imports) from sources other than the nationalised coal industry. In fact, the CEGB have already started to import more coal, and it has announced that it will be unable to enter long-term commitments with BC until it has secured supply contracts with its customers, i.e. the 12 area board that will distribute electricity (FT, 09-06-88:9).

NALOO's members are almost certain to benefit from electricity privatisation. They claim they have been squeezed out of the power station market by collusion between the public sector monopolies over quotas and prices. In addition to paying royalties amounting to £13.50 per tonne they have been forced to sell to the CEEB at less than £30/tonne (1987 prices). At the same time BC were selling coal at an average of £42/tonne. NALOO's arguments won support from the House of Commons Energy Committee in 1987, which asked the Director-General of Fair Trading to investigate "the unfair competition" resulting from the practices of the public monopolies, and asked the Secretary of State for Energy to consider a reference to the Monopolies and Mergers Commission.

New opportunities and the new coal masters of the 1990s?

The more favourable conditions being created by the Government for both wholly private sector mining companies, and for existing private contractors on British Coal's open pits, are leading to an increase in investment and merger activity in the private mining sector. Once nicknamed "the scavengers of the coalfields", the small private mines have gained a new lease of life under successive Conservative governments. Referring to Britain's tiny private coal industry, a recent article noted,

'The pits are a world far removed from the collective ethos of British Coal's deep mines. The owners and the miners have long lived by the philosophy of risk-taking and rewards that the term Thatcherism came to embody' (Inter City, July 1988:22).

The private coal industry in Britain produces about four per cent of total national output from around 160 very small underground mines often employing less than ten workers, 60 small open pits and numerous small-scale discard tips belonging to BC. Nevertheless, some companies are beginning to expand their UK operations in preparation for the promised privatisation. The chief executive of Ryan International, Crispian Hotson, a South African educated at Cambridge and at Stanford University (USA), spent his early career in the private mines of America. Hotson claims his reasons for moving to Wales from America was the lure of an industry undergoing change.

'Watching the Thatcher revolution from across the Atlantic, he decided that coal had some interesting possibilities' (Inter City, July 1993: 22, 25).

Ryan International, a Cardiff-based group that claims to be the "largest non-governmental producer of coal in Europe", has recruited a number of former British Coal colliery managers into its own management team. It is one of a dozen companies which clean up coal tips in the UK. But it has been very active in its investments on the continent. It acquired mineral rights covering some 150 million tonnes of coal reserves in Belgium where it reclaims and sells 700,000 tonnes of coal a year, equivalent to one-tenth of the country's coal output (FT, 04-11-86:7). Ryan has also become the first Western company to set up a joint coal recovery operation in Poland. It has formed a £3 million joint venture with Gwarecgworm, a Polish mining and railroad operator specializing in coal. Gwarecgworm is based in Katowice, the centre of Poland's coal industry which produces over 190 million tonnes a year. Ryan also owns a US opencast coal operation producing 800,000 tonnes a year.

The international activities of Ryan mean that it is

'a far cry from the "two men and a pit pony" who in 1947 were followed to continue scratching at Welsh hillsides while the NCB got on with the serious business of fuelling the nation's power stations and heating its homes' (InterCity, July 1988:25).

Ryan only employs about 100 people in South Wales compared with 10,000 people BC employ there, but it is clearly well placed to benefit from the relaxing of restrictions on private operators and possibly from the liberalisation of the UK coal market.

Ryan was one of several private groups seeking to operate its own power stations as well as owning and mining fuel reserves. It submitted a tender for the right to take over a defunct CEGB power station, the Rogerstone 120 MW plant near Newport, Gwent. Ryan claimed it could supply coal for about £15 a tonne, around a third of the cost of coal burned by the CEGB. It planned to sell power to the South West Electricity Board under the buy-back terms laid down in the 1983 Energy Act, which effectively opened the door to private power generation.

Another tenderer for the Rogerstone plant was Independent Power and Energy owned by a wealthy Greek entrepreneur, Angelo Casfikis, who has no previous experience in the power generation game. The company is also one of several under the chairmanship of former NCB Chairman, Lord Ezra. Casfikis owns two anthracite mines in West Wales and he planned to concentrate on the electricity side of his business rather than boast coal production. The aim was to supply Rogerstone from the South Wales coal washeries, using local fuel, coal tips and opencast sites. But Casfikis' plans were scuppered by determined

opposition from local residents whose pressure led the Labour-controlled Newport Borough Council to reject the scheme (Western Mail, 28-10-88). In addition to Rogerstone, both Ryan and Independent Power & Energy are tendering for other power stations in Wales and elsewhere, including the closed Connahs Quay station in Clwyd and the Roosecote plant in Cumbria (Western Mail, 03-06-88).

Another senior ex-executive of the nationalised Coal Board who is now involved in private mining is Michael Eaton, who was drafted as NCB spokesman during the miners' strike of 1984/5. Eaton now runs a construction company and two small anthracite pits in South Wales, near Swansea, in partnership with the Miller group, a Scottish construction and mining company owning opencast sites in Scotland and Cumbria.

Many private coal companies are tiny in scale and have small capital resources. A lot of private deep mines employ a few men (often less than 20) utilizing pre-nationalisation technology, including "windy picks", shovels and pit ponies (5). The mines are usually drift mines, which are entered through tunnels into the hillsides, so they do not need the maintenance of a pit shaft and winding gear. The scale and nature of such operations was described by Rhys Jeffreys, a fifth-generation "coal owner" and chairman of the South Wales Small Mines Association.

'It's like farming. People tend to get caught up in it and stay ... We just plod on quietly, with no big fortunes and no big losses' (Inter City, July 1988:27).

Small deep mines are able to continue making profits using pick and shovel methods due to their small-scale and ability to vary output

according to market circumstances. As Chesshyre, the writer of the Inter City article pointed out,

'The men they attract fit this unpredictability (of production), tending to be more nomadic than deep-pit miners, who look to the colliery for everything from welfare to housing. Miners in small pits will disappear to a new job down the road for £1-a-tonne more, reappearing just as suddenly a few weeks later'

One company that is trying to expand its coal business is Geevor, the Cornish tin mining company, which acquired a Cumbrian based coal mining group and its rights to develop the largest underground private sector mine in Britain. The take-over of Mainband Colliery Company, which has reserves of 9.5 million tonnes at Whitehaven and is capable of producing 150,000 tonnes a year for power stations and the domestic market, gives Geevor access to two ten foot thick coal seams. The projected output from the Whitehaven colliery is ten times bigger than that of most private mines, which typically have reserves of about 0.5 mt. Productivity levels of 20 tonnes per manshift, almost four times that of BC's standard mines and comparable to the Selby "super pit" complex, have been forecast. Half a million tonnes per year could be produced if the government raises the 30 person limit an employee levels (6). Geevor also paid £325,000 in shares for Eurogrange, owner of the Castle Colliery in Lancashire, which has 300,000 tonnes of coal and its thin seams are worked by 16 men with pick and shovel. Although Geevor made an operating loss of some £676,000 in 1987/8, mostly on its tin business, the company is poised to take advantage of any lessening of restrictions on private underground mining (FT, 30-06-88:31).

Lobbyists for private mining companies have argued that an extension of private operations will lead to many currently unworked deep seams in the older coalfields being opened up, thus creating employment for unemployed miners from the state sector, but this is unlikely to happen on a large-scale. This is because private operators enjoy the flexibility of being able to expand or contract production depending on price and market fluctuations. They live to short-term profits and would be unwilling to sink the large amounts of capital necessary to produce coal from deep longwall operations. Small drift mines clinging to valley sides can be operated profitably with minimal fixed capital. Undoubtedly, the most likely area for expansion is opencast mining. And as John Cooper, vice-Chairman of the Federation of Small Mines put it,

'British Coal are worried to heaven about having their lucrative opencast business stripped away from them' (The Engineer, 05-03-87:20).

This is unlikely to happen, however, unless the government decides to sell the Opencast Executive off as a separate entity. A more probable scenario is that the lifting of tonnage and reserve constraints on wholly private enterprise activities will lead to more private opencast coal, say around two to six million tonnes, competing against around 15 to 18 mt of opencast coal marketed by BC in the early 1990s (7).

The Federation of Civil Engineering Contractors (FCEC), which has some twenty member companies operating UK opencast sites, argues that the Opencast Executive is "a prime candidate for sale to the private sector" but that this should be done in stages (Energy Committee, 1986, vol. 1, memo. 32). They suggest that the OCE be split off from British

Coal as a public enterprise, but responsible to the Department of Energy, and continue its survey and exploration work. It should continue to progress new sites through the planning process, but an increasing proportion of these sites could then be sold on a lump sum or royalty basis to private firms, who could then take over production. According to the FCEC this would allow time for "a truly competitive industry" to be "created from the grass roots upwards". Of course, such policies would greatly increase the control and profits of the main private contractors within the FCEC presently operating OCE sites (see Table 7:9).

Relations between BC's Opencast Executive and private contractors has been described as

'the best example that there is of collaboration and close working between private enterprise and a nationalised industry' (Shand, 1980:32).

This relationship is likely to alter before full privatisation of the industry can take place. Already the Department of the Environment is preparing the way for an expansion of opencasting. It is increasingly likely that BC's monopoly over the nation's coal resources will be removed and the royalties private operators pay will be reduced. This will simultaneously keep profits made from opencast activities within the nationalised sector and increase the opportunities and profits of private capital in the opencast industry.

In 1987, the Department of Energy confirmed that some of Britain's biggest construction companies were to be invited to take a £250

million share of the opencast coal market (Sunday Telegraph, 26-07-87:4). Precisely what is meant by this announcement was not made public, although it is known that talks have already taken place between energy ministers and officials and construction company executives (Financial Weekly, 22-10-87). All of the major "players" for shares of the opencast coal industry have diversified interests in other industrial activities. A few examples are useful in order to gauge not only who will benefit from privatisation but how and what this will mean for Britain's energy future.

Several companies own and operate opencast sites in the UK and overseas, including sites in the USA, and so are in a strong position to benefit from any expansion of the UK's opencast sector and any extension of private ownership. They would also benefit from an increase in the international coal trade to Europe. One of these companies is Burnett & Hallamshire's Mining Investment Corporation (MINCORP), which owns mining operations in Chile, South Africa, and the USA, and has recently merged with Anglo United to become the largest private coal mining concern in the UK if OCE operations are included. Northern Strip Mining (NSM) is its UK subsidiary and it is capitalised on the stock market at about £140 million. Following the Anglo merger, NSM's shareholders include Anglo United (24%) and the Kuwait Investment Office (22%) (8).

Another important merger in the opencast industry was the £27 million takeover of Derek Crouch, the construction and mining company, by Ryan International. This effectively meant that Ryan controlled a substantial segment of the UK opencast mining industry. In fact, Ryan claims to have 42 per cent of all reserves - totalling 60 million

tonnes - currently under contract for British Coal (FT, 08-09-88:11). In turn, an attempt was also made to merge Carless, an independent oil company, with Ryan, to create a diversified energy group, although this failed to materialise (FT, 18-10-88:29). Such merger activity is likely to change the shape of the ownership of Britain's energy resources once privatisation has been complete. It may leave a small number of diversified companies controlling the bulk of the country's coal, oil and gas reserves.

Taylor Woodrow owns opencast interests and is one of the most profitable construction companies in the UK. It is a player in several parts of the UK energy sector. The 1980s have been golden years for Taylor Woodrow, which has directly benefitted from a range of government policies, from the development of St. Katherine's dock in London to the proposed Channel Tunnel, for which it is an important contractor. Its pre-tax profits for 1987/8 were around £90 million, including £50 million from housing and construction. Taylor Woodrow is now seeking the chance to make money from the privatised electricity windfall (FT, 20-04-88:Lex Column).

In 1984, the company studied the possibility of taking over former CEGB power stations at Plymouth and Camarthan Bay, but failed to secure "attractive" terms for re-selling power to the national grid. It is also part of a private consortium comprising Balfour Beatty, the construction arm of the BICC engineering group, and Schroders merchant bank, seeking to construct, own and operate private power stations. The consortium have set up a private power station company called Thames Power, which hopes to built a 1,000 Megawatt plant at Barking Reach in east London. Agreement to work towards construction was

signed by the company and two of the site's three owners - the London Borough of Barking and Dagenham and the CEGB, which until 1982 had operated a coal-fired plant there. The most likely fuel for the new plant is gas, which will mean the Energy Secretary waiving provisions under the 1976 Energy Act prohibiting gas use for power generation at power stations.

Taylor Woodrow is also part of the National Nuclear Corporation (NNC) and has won sizeable contracts for the Sizewell "B" Pressurized Water Reactor (PWR). Its construction interests in both the fossil fuel and nuclear sectors means that it is likely to benefit from the state's pro-nuclear strategy as well as the new opportunities resulting from the privatisation of the electricity supply industry. Significantly, the company can also supply fuel from its opencast involvements in Northumberland. If the North Eastern Electricity Board (NEEB) decides to build several power stations in the area, Taylor Woodrow may increase its stakes in the opencast industry there.

It should be obvious that government policies are designed to not only tilt the balance in favour of private capital but are intended to completely eliminate public ownership in the national energy sector. Of course, this may result in a more competitive electricity supply system utilizing more small-scale power plants fitted with pollution-reducing and energy efficient combustion technology. Even though the government is, according to one Financial Times report, "in danger of creating a lopsided hybrid", with most of the electricity generating capacity remaining within the split up CEGB and SSEB in Scotland (FT, 15-03-88:7).

What is of concern here are not so much the intricacies of a privatised electricity supply system, but the structure of control and ownership of the nation's fuel reserves and the supply of fuels to power stations. Current government policies are aimed at loosening British Coal's monopoly thereby creating more space for private profits to be made and more openings for private sector investment. A variety of private operators are likely to benefit, from the tiny coal "prospectors" to large construction companies with diversified business interests and international investments. This will make it very difficult for governments in future to either regulate the coal industry or to attempt any degree of coordination between national energy industries or long term planning within the coal industry. The big energy players, in particular, own overseas energy operations and are likely to gain profits from both ownership of fuel reserves in Britain and an increase of fuel imports into Britain. In the short term, this could have devastating consequences for deep coal mining, which requires a longer term planning and investment perspective than many private mining companies are willing to take, especially if there are profits to be made from opencasting and alternative fuels. The following section will now explore the likely effects of both an expansion of opencast mining and a liberalisation of Britain's coal markets on mining machinery manufacturers.

7.3 Opencast engineering linkages in the UK

Hitherto, most of the debates concerning opencast mining in the UK have centred on the various economic issues, such as the question of whether or not opencast coal subsidised deep mining, and on the issue

of job losses in deep mining as a result of opencast expansion. Or else they have focussed on the environmental problems of opencast mining. Very little attention has been given to the pros and cons of opencasting and its possible expansion for UK engineering concerns. This section is an attempt to widen the debate on opencasting by examining linkages with machinery makers.

In March 1987, The Engineer ran an article entitled "The rise of a new coal industry", and it enthused over how the growth of opencast mining and a better deal for the private sector could shape the future of coal and ensure it a firm place in Britain's total energy mix beyond the year 2000. The fact that such an article appears in a magazine aimed at engineers raised a number of questions-

- (1) What are the indirect benefits of opencast mining to the UK engineering industry?
- (2) What will the consequences be for deep coal mining and engineering companies associated with deep mining of a further extension of opencasting, and indeed of privatisation of the coal industry, either in part or in full?

As noted earlier, British Coal's Opencast Executive only has a limited stock of large plant that it hires out to private contractors. Most machinery is purchased direct by the contractors themselves. They can choose various means of financing plant acquisition, purchase, lease or short term hire. It is up to the civil engineering contractor to "optimise the relationship between plant and productivity" (Colliery Guardian, June '87:326). BC has only to choose between the various

tenders it receives to work a particular site. This is a major contrast to deep mining which is operated entirely by BC. BC controls the production process, shapes the technical change process, and through its purchasing policies, has had a great influence over developments in the mining machinery industry (see Chapters five and six). And BC's preference for British equipment supplies wherever possible has ensured a strong domestic market for numerous companies. None of these claims can be made for opencast mining. Although the existence of an opencast industry in the UK has enabled the development of a small number of opencast suppliers, the dominant suppliers for most extraction equipment are all established foreign-owned multinational companies (MNCs).

Britain started importing excavating machinery from the USA in the early days of opencast mining in Britain. Opencasting became part of the emergency measures introduced in the battle for increased coal production during World War II. Under section 36 of the 1946 Nationalisation Act (amended by the Opencast Coal Act of 1950), provision was made for the NCB to issue licences to private operators as long as their operations were "not likely to exceed or greatly exceed 25,000 tonnes". It was around this time that there was to be a rapid increase in opencast operations in the USA and in Australia, where some sites were ten times bigger than the largest UK open pits.

One of the first overseas producers to benefit from the small British market, particularly for lower capacity equipment, was the Lima Company of Ohio. Hundreds of Lima 1201 and 802 machines were imported, replaced in later years by Lima 2400s. Other American corporations followed. In the 1980s, foreign-made and/or designed models dominate

the home market for excavation machines used in open-cast operations. Tables 7:10 and 7:11 illustrate the dominance of MNC suppliers, such as Caterpillar, Case, Lima, Dresser (Marion), and Bucyrus Erie of the United States; Komatsu, Hitachi, Kawasaki and Mitsubishi of Japan; and Mannesmann Demag and Orenstein & Koppel (O & K) of West Germany.

British-based suppliers

Overseas suppliers have captured over 70 per cent of the excavation machinery market for UK opencast mining and quarrying sites for most items of equipment. As Tables 7:10 and 7:11 indicate, only Aveling Barford (dump trucks) and Ransomes & Rapier (R & R) (draglines) break the lists of mostly North American, West German and Japanese manufacturers. The size of the British opencast engineering industry is small in comparison with the major foreign competitors. Table 7:12 lists the main UK based suppliers to the opencast industry. Most of these firms have entered the opencast equipment market as a side-line activity to their involvements in the construction machinery industry and in quarrying, where similar machines are needed. They are mostly located a long way from areas of traditional coal-mining activity. A reasonable estimate of the total number of jobs in the British-based suppliers to opencast sites is 12,000 people. This is an upper estimate because it includes employees engaged on manufacturing excavation equipment for other industries and for export (9).

A number of the UK based companies are subsidiaries of MNCs, and others manufacture equipment for MNCs. For instance, Ruston Bucyrus (Grantham) is part of the global operations of Bucyrus Erie, the Milwaukee based dragline manufacturer. Artix (Peterlee) designs

articulated dump-trucks which are eventually sold under the Caterpillar label. Brown International (Pool), owning several UK subsidiaries making earthmoving, quarrying and construction machinery, sells dump trucks made at their Molde plant in Norway to Komatsu. Aveling Barford has also tried to form a joint venture with Kawasaki concerning the manufacture of Japanese products under licence for the European Market. The fact is that it is very difficult for the British companies to survive in highly competitive excavating machinery markets unless they form technology or manufacturing agreements with important global suppliers.

In the eighties, markets for numerous items of earth-moving and construction machinery have had excess capacity owing to a worldwide increase in the manufacture of such items in the 1970s. This had led the MNC producers to rationalise their activities and to increase world market shares by forming joint ventures with other MNCs and by signing up manufacturers under licence in different parts of the world. As Garnett of the FT put it:

'In engineering, clever niche manufacturers will always survive. But the best of the bigger companies are becoming larger through acquisitions and joint ventures. They are seeking control of more markets and broadening core produce ranges in order to offer customers complete services and systems' (FT, 24:08:88:10).

This is especially so in the construction engineering industry, dominated by Caterpillar and Komatsu, which together probably account for 50 per cent of world sales. Both corporations have been adding to

their product ranges through alliances, and both have world-wide networks of branch plants and manufacturing licences including some in the UK.

British-based suppliers have had some success in markets for smaller, more flexible, modular machines for opencasting. But for many opencast items the home market is simply too small and sites are on too small a scale to provide British firms with a home base for providing an appropriate "show case" for the big export markets of the United States, China, India and Australia (see section 7.4 below). In the broader construction equipment markets it has been difficult for established UK suppliers to survive against foreign competitors. This is illustrated by the cases of Aveling Barford and Ransome & Rapier, two of the oldest British firms in these markets.

Aveling Barford is the product of a merger in 1933 between two companies, one of which, Aveling and Porter, made the world's first steam-powered road-roller in 1867. During the 1960s and 1970s the company sold huge quantities of dump trucks and graders in Britain and in the old Commonwealth territories, although open-cast machines destined for UK sites represented only a tiny fraction of Barford's market mix. Since the late seventies the company has struggled to remain profitable, and most of its difficulties have been attributed to its loss of individual identity and poor management after it had become part of British Leyland's Special Products Group. In 1983, Aveling Barford was bought from BL by a Singaporean businessman working through a Hong Kong-based company and an American attorney-consultant.

Under absentee-ownership Barford continued to make heavy losses, and it introduced redundancies. In the mid-seventies the Grantham factory employed almost 3,000 people, but this had shrunk to a third by 1985. Further cost-cutting measures had left only 580 employees by April 1988. In June, Aveling Barford's bankers called in the receiver after the company had made a £3 million loss on sales of £30 million in 1986/7, and further losses in 1987/8 on a similar turnover (10).

The company's problems were related to its failure to keep pace with the tremendous shifts in product and marketing orchestrated by the giant MNCs. Aveling was just entering the market for more manoeuvrable articulated dump trucks in 1987. In the market for rigid dump trucks its products were out-dated. Caterpillar and Komatsu had bought out high-speed, high-specification rigids. These companies were also able to sign up their own licencees, such as Artix (Peterlee) and Brown International, to increase market shares. Even in Aveling's area of strength - compacting machinery - the company stuck to deadweight machines at a time when European competitors were producing specialised vibratory rollers which were replacing deadweight versions (FT, 16-06-88:26). The essential point is that Aveling Barford's troubles were not connected with events in the home market for British coal-mining machinery, but were related to its competitiveness in world earth-moving equipment markets. In fact, the company continues to be an important supplier to UK open pits owned by British Coal. Of the 595 dumptrucks on NCB sites in March 1985, Aveling Barford had supplied 60 machines (see Table 7:11).

Ransome and Rapier (R & R) was similarly well placed in the UK market for draglines. Nevertheless, R & R lost out to competitors in

foreign markets for draglines and crawler loaders. It was eventually sold in 1987 by its parent company, Central and Sherwood, to Stothert and Pitt of Bath.

The industrial structure of the UK construction and earth-moving equipment industry has undergone rapid changes in the 1980s. This has partly been associated with new opportunities in the opencast mining industry. Whilst some traditional manufacturers have struggled to survive a few new-comers have expanded rapidly through acquisition and international joint ventures. One notable example of this is the Brown International group operating from North Yorkshire. This group only became active in the construction machinery industry after it had bought Moxy, a company based in Norway making dump trucks, in 1983. Since then Brown International has become a diversified manufacturer. It bought Frederick Parker a Leicester-based stone-crushing equipment business, and purchased Hymac's excavator making business from the BM Group. As a result the group's total sales have increased from £29 million in 1984 to £59.8 million in 1987. It has also negotiated a deal with British Coal to build a factory and a theme park on the former Cortonwood Colliery site in South Yorkshire. The new factory will make dump trucks and wheel loaders with potential opencast mining applications. Brown International increased its sales turnover overseas by signing deals with Komatsu and TCM of Japan for dump trucks.

Another diversified construction equipment concern is the BM group which has purchased manufacturers of concrete-mixing machines, excavators, dump trucks and lifting equipment. The group bought Hymac (later sold to Brown International), Haulamatic (dump truck maker) and

Ritemixer (cement making platforms) from Northern Engineering Industries (NEI), as well as D Wickham (hoists and lifts) and Benford Concrete Machinery. The group's total turnover leapt from £36 million in 1985/6 to around £100 million for 1987 (FT, 30-11-87:12). Opencast mining equipment probably represents around ten to 20 per cent of total sales. Finally, another expanding company in related markets is DJB, owner of Artix, which has bought from General Motors truck operation in Dunstable a new range of all-wheel drive vehicles, and has a new factory in Stockton-on-Tees making off-road vehicles.

A number of interrelated points can be made from this brief survey of the British opencast machinery industry. Firstly, opencasting involves many fewer specialist suppliers than deep coal mining. A few important British suppliers exist but there is not a comprehensive engineering infrastructure supplying opencast mining. In contrast, British Coal has long established and close technical relations with suppliers in all the major markets for deep-mining machinery. Secondly, most suppliers of opencast items are involved in several markets spanning construction projects, agriculture and quarrying applications. The British opencast coal industry is not necessarily a major market, and where it is it may be through the European marketing arrangements of a multinational purchaser. Thus, it is obvious that any policies designed to expand opencast production will have only a limited beneficial impact on UK manufacturing activity, and indeed, on engineering employment. There may well be net negative multipliers on the British engineering industry if an expansion of opencasting leads to a reduction in the home market for deep mining equipment as argued earlier.

Branch plants and global operations : The case of Caterpillar

The most likely beneficiaries of increased opencasting in the UK are the dominant MNC suppliers. Some of the largest employers in the British earth-moving equipment industry are MNC branch plants. These plants are part of the global operations of US and Japanese MNCs seeking convenient sites to increase their shares of the lucrative European market. Very often the MNCs are attracted to particular sites by the offer of various tax free, financial, and other business incentives by competing local authorities. This is especially so in depressed areas with higher than average unemployment rates. Local authorities in these areas have spent £millions of public money offering low-cost sites to attract inward investment by multinational capital in job-creating production facilities. Most of the giant earth-moving equipment makers in Britain have set up plants in South Yorkshire, the north east of England and Scotland, partly because they offered low-cost manufacturing bases in the European market. But as in other industries, MNC branch plants have proved to be a mixed blessing for the economies where they are based.

The story of Caterpillar in Scotland is an illustrative example of the negative side of inward investment. Caterpillar Incorporated's headquarters is in Petoria, Illinois, USA. But it is truly a multinational corporation for its products are made in 15 plants within the US and 15 plants overseas through wholly owned subsidiaries in Australia, Belgium, Brazil, Canada, France, Mexico, and the UK. In addition it has an 80 per cent owned subsidiary in Indonesia and 50 per cent owned companies in Japan, India and Italy. Contract manufacturing is done in the US, Canada, Norway, France, South Korea, UK and West

Germany. Caterpillar products are made under licence by independent manufacturers in Argentina, India, Malaysia, New Zealand, the People's Republic of China, South Africa, South Korea and Turkey. As George Schaefer, Caterpillar's Chairman of the Board, puts it:

'Competitiveness in a global economy has been and will continue to be, Caterpillar's decision-making process' (PetroMin, August 87:39).

It is only within this global context that corporate decisions affecting Caterpillar's branch plants in the UK can be understood. In the early 1980s, worldwide demand for Caterpillar products slumped by 40 per cent and the Corporation was plunged into the red with a \$428 million (US) loss by 1984. At the time Caterpillar was expanding the proportion of equipment it made outside its USA base. The "Cat" plant at Uddingston, near Glasgow, established since the late 1950s, was to be one of the beneficiaries of the corporate expansion.

Three-quarters of Uddingston's work was in the production of components, rather than in assembling tracts or other machines. About 60 per cent of those components were used as spare parts across the world, with the rest feeding "Cat" assembly-plants in England, France and Belgium. In 1982, Caterpillar decided to make 165hp D6H crawler tractors from the Uddingston plant. Although unions at the plant hoped Uddingston would be the single source for the model Caterpillar decided to make D6H's at two plants, the other one being Davenport, Iowa, USA (11).

In 1985 and 1986 Caterpillar made colossal net profits of \$350 million and \$76 million (US) respectively. In fact, Caterpillar's

sales of earthmoving equipment in 1986 totalled \$7.3 billion (US), double those of its nearest rival, Komatsu. On the strength of these profits Caterpillar announced a major new round of investment in its worldwide manufacturing capacity, including some £62.5 million (sterling) for Uddingston. Simultaneously, over-capacity in world markets for earth-moving and construction machinery had led to a price war between the MNCs with aggressive selling at rock-bottom prices (FT, 24-03-87:32). Furthermore, Caterpillar was hit by a weaker US dollar which affected the dollar costs of European-sourced equipment and components. Such commercial pressures combined to change the minds of Caterpillar's corporate decision-makers who reversed their earlier decision to expand Cat's manufacturing capacity. Thus Uddingston became part of a rationalisation strategy that involved the closure of several plants; a reduction in Caterpillar's in-house factory floor-space by a quarter, and a cut in its global workforce from around 89,000 to some 55,000 employees (FT, 24-03-87:32).

These capacity cuts were the necessary price to pay in order to reduce Caterpillar's worldwide manufacturing costs, which from its corporate bosses' perspective, were deemed to be 15 per cent adrift of Komatsu's. To do this Caterpillar reduced in-house assembly but has strengthened its global network of subcontractors and licencees. It also formed a joint venture with Mitsubishi's earthmoving equipment company in 1986 which effectively merged their respective hydraulic excavator businesses. The Japanese company took over responsibility for all design and development work on new excavators outside Europe. Within Europe, Caterpillar concentrated investment in a few plants, such as its engine and earth-moving machinery factory at Gosselies in Belgium, where 35 large machining systems were installed as part of an

international \$1 bn (£550m) investment programme, called "Plant With A Future" (PWAFF) (FT, 16-06-88:13). Meanwhile Caterpillar pulled out of Uddingston, which was suddenly transformed into a plant without a future. The Corporation, which had just completed £12 million new investment in a flexible manufacturing system (FMS) at the factory, decided to transfer its machining centres and assembly lines to other European sites, leaving Uddingston with an empty factory shell (The Engineer, 26-03-87:20).

Caterpillar's sudden announcement of Uddingston's closure came as a shock to everybody from line-welders to industry analysts, and it provoked a long "sit in" by most of the direct production workers at the plant. It also embarrassed the Secretary of State for Scotland, Malcolm Rifkind, who only a fortnight earlier had singled out Caterpillar as a "ray of hope" for the Scottish economy in his New Year's Day message (FT, 16-01-87:7). One week after Caterpillar's decision, Rifkind summoned Cat's American president to London for discussions about "alternative arrangements" for Uddingston, but he failed to elicit any response. The fact was that in the global plans of Caterpillar's corporate bosses Uddingston and its workforce were expendable parts of the Corporation's worldwide drive for profits. Firstly, D6H crawler tractors were already made within the USA. Secondly, Caterpillar have adopted a strategy of reducing in-house components manufacture. As Caterpillar's vice-president and general manager of its diesel division, John Winters, put it:

'We want to do the things we do well and work with other companies which can manufacture components cheaper or better than we do' (FT, 16-06-88:13).

All these considerations out-weighed offers of a further eight million pounds of public money from the Scottish Development Agency (SDA) towards future manufacturing investment at Uddingston. Caterpillar's global business philosophy and concern for international competitiveness dictated its actions. As Schaefer argued,

'Our cost reduction program enabled us to compete aggressively. We were able to maintain and even slightly improve our positions in the industries we serve while keeping a strong US manufacturing base' (PetroMin, August 87:40).

The Caterpillar example raises a number of important points of relevance to the study of both UK engineering linkages and energy policy. It illustrates the international competitive forces at work in the markets for excavating machinery and components. This is important for all engineering capital goods. But it is necessary to emphasize the fact that the UK is a dominant world supplier of longwall machinery and only a marginal source of opencast machinery. Whilst British Coal and the national government are able to exert a definite influence on the manufacturing decisions of longwall suppliers, they have negligible control over production decisions made in the construction and earth-moving equipment industry. This is particularly so in the case of the big MNCs whose corporate decisions are made thousands of miles away from the UK plants (12). The engineering linkages between supplier and buyer are easily defined in the case of Britain's deep mining industry. This is not so with the opencast linkages where import penetration levels are high and all suppliers have many markets for similar excavation plant. Furthermore, branch plants like Uddingston make components for assembly in other plants and other countries, which makes it difficult to identify eventual market destinations.

One of the fears of Anderson Strathclyde's unions, local councils and the SDA when faced with the Charter Consolidated take-over bid in 1982, was the fact that the takeover would remove Scottish headquarter's control, thereby increasing the vulnerability of the local workforce to international pressures influencing Charter's global investments. Like Anderson Strathclyde, Caterpillar was one of the top five companies in Scotland. Also like Anderson, the plant at Uddingston was a major source of employment in Strathclyde, which had an unemployment rate of above 20 per cent at the start of 1987 when the closure was announced (13). In fact, the loss of 1,200 jobs at the plant raised unemployment levels on some of the nearby Tannochside housing estates to almost half their working population (The Guardian, 06-04-87). Caterpillar's factory did support a number of local raw material and components suppliers, although it was not as significant in this respect as Anderson's Motherwell plant. Unlike the Scottish company, Caterpillar's major investment decisions were always made from across the Atlantic.

Whilst, Caterpillar moved out other MNCs have moved in. Komatsu has established itself at the former Birtley site, near Newcastle-upon-Tyne, of Caterpillar, which was closed in 1983. Komatsu started production at Birtley in October 1983 and employs 279 people there making hydraulic excavators for the European market. Like Caterpillar, Komatsu has numerous overseas plants, including those in the UK, Indonesia, Brazil and Mexico. It has also established cooperative ventures with Brown International for dump trucks, ABG Werke of West Germany for vibrating rollers, and with Yamada Dobby of Japan for high-speed, small presses. In the big North American market it has signed a deal with Dresser Industries to give it a bigger market

share on Caterpillar's home patch (FT, 24-08-88:10). Dresser is the parent of the coal-shearer maker, BJD at Wakefield, and it has a UK marketing division for its "Marion" excavating plant used on opencast sites.

J I Case of the US has established a tractor-making factory at Doncaster in addition to its tractor plants at Huddersfield and Leigh, and a construction equipment plant at Redruth in Cornwall. The Doncaster site is also functioning as the marketing base for J I Case Europe, which offers a selection of opencast machines, such as Poclain excavators and wheel loaders (Colliery Guardian, June 87:229). The £90 million investment in the Doncaster plant represents "one of the largest inward investment projects seen in Britain" (FT, 29-10-85:1). It was part of the broad corporate strategy of Case's parent, US Tenneco, an energy and engineering conglomerate, which sought to transfer US manufacturing capacity to Europe. The Department of Trade and Industry, which helped Case cover its financial costs in moving plant from the USA to Doncaster, estimated that the company would be buying almost £60 million worth of raw materials and components from other UK suppliers by 1990.

European producers of earth-moving machinery have set up branch plants in Britain. These include Volvo BM (UK) Limited at Cambridge making Michigan wheel loaders, Demag H85 hydraulic excavators and Euclid R50 dump-trucks (see Table 7:11). Volvo also has a truck-making plant at Irvine, near Glasgow, employing 370 people. Liebherr (GB) Limited, one of the major suppliers of opencast mining machinery in Europe, has an excavator factory at Hatfield.

Taken together, the branch plants probably employ as many people as the indigenous manufacturing suppliers to Britain's opencast industry. This was especially so when the Uddingston plant was operational, for it employed nearly as many people as the total workforce of JC Bamford, UK's leading earthmoving equipment maker. The prominence of overseas manufacturers of earthmoving machinery in the UK market raises further questions about current energy policies aimed at liberalising the home coal market, as well as reducing overall production costs by raising opencast output. Such policies will increase foreign investment in Britain's energy and engineering industries and may do irreversible damage to the domestic deep-mining infrastructure (chapter six). In order to gauge the likely winners and losers amongst the national and multinational companies servicing Britain's coal industry it is necessary to examine world coal markets in more detail.

7.4 World Mining Equipment Markets

The British government wants to open up the British coal and electricity industries to international market forces. This will undoubtedly increase coal imports. Estimates of the level of coal import penetration vary widely between five and 30 million tonnes. More coal produced in Britain's deep mines is likely to be displaced if the electricity utilities and area boards decide to adopt short-term cheap fuel contracts with importers, and they diversify their fuel base to include cheap oil, more gas imports and surplus electricity from the French nuclear programme. Even so, coal will remain a major source of fuel for UK power stations to 2000 AD. Precisely how much deep coal is

substituted for imports of coal and other fuels will largely depend on the productivity of British Coal collieries; the growth of UK energy demand and cost of alternative fuels; movements in international spot market prices for traded steam coal; and the development of Britain's own deep-port handling facilities and inland transportation costs (Prior and McCloskey, 1988:Chapters 7 and 8).

As government policies stand in the late eighties, a higher fuel import penetration level is likely for the early 1990s. In a higher import scenario it is pertinent to ask

- (1) What are the main export product markets for UK-based manufacturers of deep-mining equipment, and where are they?
- (2) What are the main constraints on UK suppliers who are trying to expand their export base at a time of contracting home demand for most items of colliery-related equipment?

Major coal producing countries

Table 7:13 (a) and (b) indicate the countries where most of the world's estimated "proven" recoverable reserves of coal are located and the major producing countries. Virtually all the major producers have high proportions of surface mining apart from the People's Republic of China (see Table 7:14). Although new big open pits are being opened up in China and it is estimated that China will be producing between 120-200 mt from surface mines by 2000 AD (Mills, 1985:467). In contrast, Britain accounts for less than one per cent of the global surface mining industry and its total annual production of about 15 mt

is equal to the annual output of single big open pits in Australia and An Tai Bao opencast mine in China.

As noted in earlier chapters, British mining machinery specialists have gained a comparative advantage in world markets for deep mining equipment, especially that associated advance and retreat longwalling. In 1985, NEDO highlighted some of the equipment areas where Britain was strong and weak (Table 7:15). In a number of mining machinery fields, such as room and pillar mining, hard rock mining and many items of surface plant, the UK has relatively few specialist producers compared to the Federal Republic of Germany, Scandinavia, the United States, Japan and the USSR.

Markets for surface equipment

Most western producers prefer surface mining wherever coal reserves lie shallow and open tracts of land are available because of the high productivity and better profit margins compared with deep mining. On many big opencast sites in Australia and the United States output per manshift (OMS) is above 30 tonnes, which is over double the OMS recorded at most deep mines. The UK is a minnow in the opencast industry (see section 7:3). This is reflected by ABMEC statistics over the last decade. Surface mining exports vary between ten and 40 per cent of total exports from ABMEC member companies (see Table 7:16). Few British suppliers have been able to win contracts for major new open pit developments in Colombia, the USA, Australia or China. Although they have had more success in smaller scale projects in India, Africa, Turkey and Chile (ABMEC, 1988). Where the MNC's do not dominate overseas markets, the state-owned machinery export companies

of the Soviet Union have had considerable success in selling mining and construction and earthmoving machinery in numerous developing countries outside Comecon (Far East Technical Review, October 1987:25-50).

Britain's opencast supply network is relatively underdeveloped compared to the underground mining infrastructure. Whilst some British firms have found a niche on international markets for small-scale modular plant, it is unlikely that any expansion in surface mining will alter the ratio of imported to home produced technology on UK open pits. More inward investment is to be expected from the earthmoving equipment giants, and import levels will remain relatively high for surface as opposed to deep mining capital goods. The only way the unfavourable trade balance in surface mining machinery can be changed is by imposing import duties and restrictions, which is unlikely given the wide range of uses for most excavating machines and the government's free trade rhetoric.

Markets for longwall equipment

The fact that fully mechanized longwall mining accounts for less than ten per cent of total world coal output means that for British mining machinery exporters mining developments in other longwalling areas of the world, such as New South Wales (Australia), Shanxi province (China), parts of the massive coal industries of the USA and Soviet Union, are crucial to their immediate medium- and long-term production plans. Until recently British Coal has been the dominant influence on the domestic mining machinery industry, and indeed, it still is for most UK mining suppliers (see chapters five and six). It was pointed out in the last chapter that Plan for Coal in 1974 with its

over-optimistic coal production forecasts may have led many suppliers into a false sense of demand security. NEDO (1985) argued that manufacturers were too complacent in the seventies regarding increasing longwall activity abroad. In contrast, West German suppliers quickly seized market opportunities, especially in the longwall industries of the USA and the Eastern Bloc.

After the OPEC oil price rises of 1973/4 there was an increase in coal mining activity in many parts of the world as producers sought to gain advantage of the sudden price advantages of coal. Numerous oil companies diversified into coal and other fuels (see below). New developments in longwall mining methods, particularly the introduction of more powerful, heavier-duty equipment, shield supports, higher tonnage capacity and higher speed conveyors, as well as micro-process based monitoring and control equipment, led to increases in longwall productivity. Deep-mining operators began to install more longwall faces, which have higher coal recovery rates than various methods of room and pillar mining (see Figure 7:5 and 7:6). In addition, China began to open its coal base and to open its doors to foreign investors.

Reduced NCB demand in the 1980s led to increased export activity by mining machinery suppliers. By 1984 exports had increased on 1980 levels but total sales of equipment were about 50 per cent below 1980 levels due to the reduction in orders during the miners' strike (ABMEC, 1986). For ABMEC as a whole, the export proportion of total sales was about 20 per cent in 1985. Although this was low compared with exports of around 40 per cent for the mechanical engineering division, the total level of imports was below five per cent of home consumption compared to 33 per cent for mechanical engineering as a whole.

It is necessary to look below the aggregate figures for they mask a large degree of export performance variation between suppliers. Only the main primary suppliers like Dowty, Anderson Strathclyde and Gullick Dobson, and the subsidiaries of the big engineering groups such as Brush Transformers (Hawker Siddeley), NEI Mining Equipment Limited, and GEC's various mining suppliers, have the overseas marketing and sales services to aid export levels of over 40 per cent. Even these companies will have problems in raising exports to replace further reductions in British Coal demand due to pit closures in the 1989-1995 period (ABMEC, 1988; NEDO, 1985). This is especially so for manufacturers of dedicated longwall machinery who have limited overseas markets to aim for, and they face increasing competition from the US, Japanese and West German manufacturers. For smaller British Coal suppliers the future is in considerable doubt if their main products are longwall-specific and if they have a small export base (ie less than 20 per cent of total sales).

As most UK suppliers are relatively isolated from the dominant trends in surface mining and metalliferous mining technology, it is necessary to identify the geographical concentrations and size of the world's major longwall markets. In 1985, longwall mining accounted for about 60 per cent of global ^{deep} coal production from approximately 18,000-19,000 coal faces. Nevertheless, the number of fully mechanized faces was less than 3,000, of which the UK and West Germany combined accounted for some 30 per cent. The remaining 16,000 or so longwall faces ranged from "pick and shovel" manual methods to minor mechanized, were mostly in China (in excess of 12,000 faces) and the USSR (3,500 faces). In both the USA and Australia the installation of longwall faces rose from the late 1970s, and accounts for about ten-fifteen per

cent of total production in the US and five per cent in Australia (see Tables 7:17 and 7:18). UK suppliers accounted for about a third and a half of the longwall equipment markets in the US and Australia respectively.

Tables 7:19 and 7:20 show the major export destinations for British mining machinery manufacturers in the 1980s. The USA, South Africa and Australia account for some 40 per cent of UK direct machinery exports excluding overseas assembly (ABMEC, 1988). In these important markets most of Britain's major suppliers have established manufacturing subsidiaries. Even where UK firms have a comparative advantage over many competitors there are numerous constraints on increasing export sales. These include:

- (1) Raising finance for export contracts. Multi- and bilateral trade packages; overseas aid programmes; and soft loan facilities are very important in securing equipment orders in developing countries.
- (2) Counter-trading arrangements are equally important. For example, both the USA and Australia have exported some coal in exchange for mining plant and machinery. There are even bizarre cases of Chinese prawns and human hair for trucks, and Argentinian sheep for sets of longwall equipment.
- (3) Countries like the Soviet Union, India and China insist on some degree of transferring new technology, and the "know how" to make it, to indigenous institutions. So exporting firms have had to provide training to indigenous engineers

and managers. These contracts involve joint ventures between buyers and sellers in both private and public sectors.

(4) Purchasing agencies, companies or governments may insist on some degree of local manufacture. In both Australia and South Africa the states have encouraged selling companies to set up manufacturing subsidiaries (14).

(5) Mechanized and integrated longwall installations involve the formation of manufacturing consortia covering all aspects of mine development. They also involve collaboration between government agencies, financial institutions, mining consultancies, coal exploration firms and machinery makers.

Given all these factors, companies have to devote a lot of time, capital and effort into raising exports. Sudden contractions in the deep mining industry within their home market are likely to lead to various forms of restructuring activity including cuts in production capacity. In its submission to the House of Commons Energy Committee, ABMEC (1986) argued that a strong home base for mining machinery was a pre-requisite for success in export markets. Indeed, British Coal's historical technical and commercial links with British manufacturers have given them an area of internationally-recognised technical expertise. If the domestic deep mining industry is allowed to contract to levels of say below 80 mt per annum, there will be irresistible pressures amongst mining suppliers for further industrial concentration, plant closures and job losses (see Chapter six). Already there are signs that British Coal's list of preferred suppliers is getting shorter.

In recognition of Britain's shrinking home market NEDO (1985:93) noted.

'In any study of a particular sector of industry, it is easy to put forward a case for special treatment by government but the development of overseas markets by the mining machinery industry has been adversely affected by a number of government policies, some of which are of very long standing, but which are specific to mining machinery'.

NEDO called for more government financial assistance and more flexible bilateral funding arrangements for specific overseas' mining projects. They recommended an extension of Aid and Trade provisions and for more soft loans to support sales to particular countries, such as China and Indonesia.

7.5 The balance of trade and coal imports

Deep mining machinery is one of the few British engineering industries to provide substantial trade surpluses for the UK in the 1980s. In 1986, ABMEC members made around £155 million for exports of underground equipment. A proportion of these exports were in micro-processor based control and monitoring devices for mechanical and hydraulic mining machinery; mining computer hardware and software packages. Many of these "high tech" mining exports went to the United States and Asia-Pacific countries, including Japan, and reversed the dominant flow in trade for micro-electronically controlled capital goods. And this export success is within the overall context of UK engineering trade deficits of four and nine billion pounds for 1986/7

and 1987/8 respectively, and total engineering import penetration levels into Britain of almost £45 billion in terms of value (FT, 03-10-88:7).

As British mining industry suppliers lobby the government for help to assist their export drive, a number of government policies in the energy sector are directly undermining their home market base. The government insists that British Coal should align its production costs to international spot market prices. It is encouraging a "liberalised" British coal market enabling electricity utilities to import cheaper fuel from overseas in order to boost their profits in the run up to the planned privatisation of the electricity supply industry. International competition will make BC more competitive is the government's argument. In 1988 both the CEEB and the SSEB have started to import more coal. The CEEB is experimenting with new supply routes from ports to power stations, and private coal traders believe the Electricity Board could import 15 mt of coal a year after it is privatised and split up into two competing generating concerns (FT, 30-09-88:10).

There are a number of inconsistencies and contradictions with regard to the government's apparent free market philosophy and concern for competition in the energy sector. Some of these were highlighted in chapter four, especially the state's pro-nuclear policies. Others relate to the nature of the international seaborne coal trade and to the UK balance of trade. In the first place, current policies mark a big turnaround in public policy towards coal. Before the Sizewell Inquiry the CEEB was happy to argue that world coal prices would increase to or above \$70/tonne (US) in 1982 prices by 2000 AD. In 1987 world coal prices had fallen and the CEEB was arguing that prices would

remain well below \$65/tonne for a long time into the 1990s, and added that imports of 30 mt of coal per annum would save the CEEB £750 million.

During its first three years in office the government was content to allow in imports of coking coal, but in steam coal markets BC was still a net exporter. In 1982, BC sent 7.2 mt to the European market at \$60/tonne during a Polish miners' strike. After 1982, steam coal prices on the Amsterdam-Rotterdam-Antwerp (ARA) spot market fell to almost half 1982 levels (ie around \$30/tonne by 1985). After the national coal dispute the government adopted a free market position with regard to the steam coal trade, which was undoubtedly linked to its privatisation plans for both electricity and coal.

The major difficulty with the government's coal market liberalisation ideas is the fact that the international seaborne steam coal trade is hardly a free market and world spot market prices are very unreliable indicators of what British Coal production costs should be. Why is this so?

Firstly, whilst the steam coal trade has been the fastest growing international commodity market in the world since 1974, it still accounts for only a small proportion of global coal consumption (see Chapter four). Secondly, the seaborne trade is controlled by a few giant MNCs, energy conglomerates and mining houses. These powerful vested interests have diversified energy resource and mining investments throughout the world, and they are able to lower coal prices to below production costs if necessary, in order to win bigger market shares. In fact, after the OPEC oil price "shocks" of 1973/4,

oil companies like Exxon, Occidental, Shell and British Petroleum (BP), increased their stakes in coal exploration, production and international trading. As the United Mineworkers Journal of America (June 1986:15) put it,

'Energy conglomerates like Exxon, Occidental Petroleum, and Royal Dutch/Shell are structured to take advantage of the situation. By controlling a global network of energy production, they can shift their production from country to country with one thought in mind - maximum profits. In South Africa, for example, Shell and other multinationals are exploiting the slave-labour system of apartheid to gain their competitive advantage.'

Thirdly, states can influence international coal prices. This is especially so of South Africa and Poland's military regime. South Africa remains a major coal exporter in spite of anti-apartheid sanctions policies imposed by some western countries (Table 7:21). One reason for this is the South African regime's "cheap energy" strategy. It is able to sell coal well below operating costs in order to capture and maintain markets overseas. Coal is South Africa's second largest revenue earner which makes it politically and economically vital to the state. Domestic coal production is geared up to supply low grade coal for internal electricity generation or for coal-to-oil conversion plants. The higher grade coals are exported. Eskom, the state-owned electricity utility has designed power stations to burn low quality steam coal providing a guaranteed home market for the low grade residue after exports (FT, 09-06-88:South Africa Survey).

The power utilities of Asia and Europe purchase their imported coal from several sources which makes it easier for South African coal to be camouflaged on world markets. South African coal is transported

by cargo ships under "flags of convenience". And buyers from countries where sanctions have not been applied will buy South African coal because it is the cheapest buy (see Figure 7:7). As with the South African regime, the Polish state needs to export coal for hard foreign currency. Coal is a major revenue earner and as such the Polish coal is dumped into international markets at whatever price is necessary to dispose of the allocation for export. In other words, like South Africa, production costs play no part in the determination of price levels.

Fourthly, there is much evidence to suggest that international steam coal prices have been depressed because of conditions of overcapacity in the eighties which is the result of the up-turn in coal investment and production from the mid-seventies onwards. To counteract falling coal prices since 1982 some producers in the United States and Australia have closed mines to reduce costs in an era of narrow profit margins. For instance, in Australia 20 coal mines were closed between December 1986 and mid-1988. One long established New South Wales producer, Austen & Butta, closed down four mines, and even with burgeoning international demand for Australian coal, the company suffered after-tax losses of \$29 million Australian dollars in 1987 (Australian Journal of Mining, February 1988:73).

The British government's energy strategy, nuclear power excepted, is mainly based on short term profitability criteria and its ideological zest for privatisation, rather than long-term strategic thinking about the future shape, place and role of the national energy market within the global energy system. And as Prior and McCloskey (1988) intimated, short term criteria are not based on a comprehensive

knowledge of the way the international market for seaborne steam coal operates. They argued that British deep mines closed in the late eighties - early nineties would quickly become profitable with an upturn in international spot prices. Thus, millions of tonnes of coal could be sterilized unnecessarily if Britain adopts a high-import energy base. World market prices are highly volatile and exporters are keen to see price increases to raise their profit margins. An International Coal Development Institute (ICDI) report in 1988 has already suggested that world coal prices have already bottomed out and price rises are likely if demand increases in the 1990s (15).

In the British coal market the government's "liberalisation" policies are a boon to opencast operators in both the public and private sectors. International coal prices and the threat of imports are being used alongside external financial limits (EFLs) as ways to discipline BC and guide investment and production decisions in the home coal industry. Low spot market prices for internationally traded coal have effectively made many British pits appear to be "uneconomic" or "loss makers" to be consigned for early closure. In contrast, it is easy for the opencast operators to justify their case for expansion to the government. This is illustrated by Sir Kenneth Couzens, the Opencast Executive's chairman, use of market place rhetoric to support the OCE's case for increased opencast output in the UK.

'... if we (in the opencast industry) are not allowed to expand, then we will have to import (coal) ... The only answer is to expand and make more profits to save the taxpayer from having to prop up the industry as a whole' (Interviewed in The Times, special report on UK opencast mining, 22-02-88).

The simplistic argument that expanding opencast production British coal will be able to compete against foreign coal in a liberalised domestic market is only logical if set within the narrow parameters created by current government policies. It is only logical to allow in unrestricted imports of foreign coal if all that is of interest is short-term commercial gain. It becomes illogical to do so if in addition to short-term competitiveness, medium and long term national energy requirements are considered. Such policies will lead to the premature closure of high productivity pits and the writing off of £millions of public investment. In addition it would place increasing burdens on the Exchequer in terms of higher unemployment and social costs in the affected coalfields. Furthermore, shallow reserves of coal will be depleted faster than they would if opencast output is regulated in line with deep mine output.

A report by the Coalfield Communities Campaign (CCC, 1987) argued that opencast coal provides an important strategic reserve for the future, and that in situations of excess coal capacity opencast output should be restricted. The CCC stressed the following:

- (1) National plans and output quotas for opencast coal should be based on an assessment of long and medium term national need within the context of overall energy supply and demand, rather than on short-term market need or criteria solely dictated by concern for end-of-financial-year profits (or losses).
- (2) It is the responsibility of central government, and not an appropriate task for either British Coal or local authorities to set national requirements.

- (3) Shallow coal forms a strategic reserve of easily accessible, good quality coal that can be extracted quickly utilising modern earth-moving technology. As Peart and Rutherford (1986) argue, the low ash content, higher calorific value and low chlorine content of most opencast coals compared to deep mined coals make shallow reserves a valuable finite asset that should be conserved for uses other than cheaper steam raising in power stations. Economically workable reserves from existing deep mines should have priority.

7.6 Coalfield communities and engineering jobs

In the long term, the rapid rundown of deep mining and the opening up of Britain's shallow reserves for the steam raising market will probably make Britain a marginal producer on international coal markets at a time when the deep mining industry is becoming more competitive. But there are other important social, economic and spatial consequences of current government policies. These relate to the shape of the coal industry's engineering infrastructure and the position of the remaining coalfield communities within the national economy.

This study has focussed on linkages with the coal mining industry. A number of contrasts exist between opencasting and deep mining that are of relevance to industrial policy and the spatial distribution of manufacturing activity and jobs in the national space.

Firstly, opencasting is not a big influence on manufacturing activity in the UK. There are few specialist equipment producers.

Many of the capital goods used on opencast sites are supplied by multinational companies. Even those firms located in the UK are either branch plants of the MNCs or they are sub-contractors for the MNCs supplying machines destined for European and global markets. A second and related point is that the capital goods producers do not produce primarily for coal getting, but they are suppliers of excavation machinery for a wide range of buyers. Thus, British Coal is not a monopoly buyer as it is for several deep mine suppliers.

Thirdly, whilst there are probably around 55,000-60,000 jobs in the engineering industry linked to producing goods for collieries, including surface plant. The number of engineering jobs related to the UK opencast industry is probably less than 12,000 people, although this figure excludes the civil engineering contractors working surface mines. And unlike most deep mining suppliers, most opencast engineering firms, apart from MNC branch plants, tend to be located outside areas of past or present coal mining activity.

The latter point raises the issue of how many jobs and where they are. British Coal often use the job creation argument as a justification for new opencast sites. They are careful to disassociate job gains on surface mines from job losses in the deep mining industry. Sir Robert Haslam, BC's chairman, has often argued that there are some 18,000 jobs in the industry plus another 12,000 jobs in deep mining where their collieries' output is blended with opencast coal. In fact, those 12,000 jobs could still be supported from a reduced level of opencast activity, and the number of people employed on opencast sites is less than BC's claim. Opencast mines employ three to four times

fewer people per tonne than the average colliery, and they do not involve purpose-built mining settlements and whole communities as deep mines do.

Considerations of the multiplier costs and benefits of opencast activity have led some local authorities to oppose new surface mine proposals in their counties. In the North East of England, Durham County Council has provided stiff resistance to the opencast lobby. It has sought to curtail opencast output at levels commensurate with the low overall total demand for coal, as well as to protect existing deep mining jobs and the countryside from environmental damage. Beynon et al (1986:47) noted how opencast coal applications in the North East were increasingly based on market forces arguments in the early 1980s. This was especially so in the case of coking coal to British Steel's Redcar plant.

'BSC, through its purchasing policies, has established clearly the predominance of market forces as determining the relationship between two nationalised industries. Within this logic, for domestic coking coal to compete with imports, it would need to be opencast.'

As argued above, the same logic now applies in relations between British Coal and the public electricity boards.

New Department of the Environment regulations have made it harder for local authorities to challenge new opencast proposals on anything other than environmental grounds (see Section 7.1). In fact, there exist strong reasons to question the DoE's definition of market need.

As Peart and Rutherford (1986:42) point out:

'The mineral planning authority's perception will tend to equate market requirement with need, stressing the social, rather than the economic, implications of the concept. Thus, in assessing market requirement in a period of overproduction authorities will wish to establish the source of coal to be displaced by the proposed opencast operations and then to carefully examine the repercussions on employment in the deep-mined sector. The wider concern stems from the interaction of the already chronically high levels of unemployment in the older coalfields with the very small number of temporary jobs created by opencast working and the low multiplier effects of opencasting on the local economy.'

Concern for the distribution of jobs in the economy is not a part of the government's policies towards the energy sector, although it has been used by government ministers from time to time to justify an increase in opencasting and even their pro-nuclear policies. With regard to deep mining,

'Government has consistently refused to recognise the scale of the consequences of coal's decline and to take measures, including the guaranteed continuation of coal-mining in areas increasingly dependent upon the industry as a source of employment ...' (Hudson & Sadler, 1987:13).

This is not only a failing of the incumbent Conservative government for successive governments since the late 1950s have failed to tackle the scale and depth of the social and economic problems created by a rapid decline in the coal mining industry (see Chapters Four and Five).

Another major weakness in government policy towards and affecting the deep mining industry, and illustrated by the author's empirical

research, is the lack of a comprehensive understanding of the linkages between energy related policies and manufacturing activity. The underlying message is that the government is not building upon existing employment, skills resources and technological strengths in both the coal mining and the engineering industries. It is preoccupied with the super profits to be gained from opencasting, and in the short term at least, from cheap fuel imports. It is not giving sufficient consideration to the economic infrastructure built around deep mining over the last century, and between the state-owned mining corporation and its private sector suppliers over the last forty years. Longwall mining may only represent about ten per cent of global coal production, but it is an area of considerable expertise for both British Coal and numerous UK-based engineering groups. It provides Britain with thousands of manufacturing jobs, many of which are in areas of industrial decline, as well as an important world market niche in the export of goods, services and technological "know how". In spite of these advantages, current policies will have detrimental 'knock on' effects throughout coal supplier networks and will make coalfield communities increasingly marginal in the national and international economic system.

7.7 Conclusion

Government privatisation plans and the proposed liberalisation of the British coal market are being closely monitored by numerous vested interest groups. It is no exaggeration to say that the government has set in motion a corporate battle for shares in the British energy sector. Some of the potential beneficiaries in the opencast and

private mining sectors were mentioned in section 7.2. They include some big civil engineering and mining groups who are in a position to profit from both opencasting in Britain and increased fuel imports.

By opening up Britain's remaining state-owned monopolies to private investment and the nation's energy sector to more imports may make it increasingly difficult for the state to influence Britain's energy mix in the 1990s. Once the energy sector is left to competing private enterprises, each pursuing their own interests, the overall interests of the UK may not be served (CCC, 1986, mem. 75 to the Energy Committee). This is especially so if the major investors in the UK energy sector are multinational in their operational scope and under foreign-ownership. Although the Energy Department has made reassuring statements that the electricity industry would be invested in mostly by British companies, it is necessary to examine who are likely to be the main investors, what interests they have, and to examine the "British" component more closely. This will be one of the purposes of chapter eight. The concluding chapter will examine possibilities for developing a cleaner, more productive and socially responsive coal industry that does not exclude the majority of people in coalfield communities, and is based on balanced manufacturing development between and within the UK space.

FOOTNOTES AND REFERENCES

- (1) Interest payments on government loans equalled £368 million in 1987/8, plus terminal depreciation charges of £241 million and net social costs of £146 million turned the overall operating profit into a net deficit of £540 million (BC, Annual Report, 1987/8).
- (2) Environmental considerations did not feature in the opencast equipment plans of private contractors in the 1970s, but they have become increasingly important in the selection of plant and cost appraisals for new opencast sites (Kelly, 1987).
- (3) As with deep mining, comparisons between productivity levels in different areas and countries are of limited use in assessing national energy needs. Owing to a variety of related factors - geological, geographical, technical and environmental - it is inappropriate to compare productivity on the small-scale surface mines of Britain with the huge open pits of Queensland, Shanxi, or Ohio.
- (4) Kleinwort Grieveson (1988) argued that liberalising the coal industry would generate savings of nearly £1.4 billion for the economy as a whole, and returning British Coal to private hands may fetch £1.5 billion.
- (5) "Windy picks" utilizing compressed air first became popular in British mines around the turn of the century.

- (6) The Whitehaven coal is on seams running through the old Haig Colliery, which was recently closed by British Coal. This left 1,500 out-of-work miners in the immediate area. It was reported in the press that Geevor received "hundreds" of job applications to work at the private mine.
- (7) Prior and McCloskey (1988:61) estimated that there will be 24 million tonnes of indigenous coal available outside BC's underground mines and that at least six million tonnes of this will come from wholly private mining operations by 1990. Of the six million tonnes, four mt will be from deep mines and recovered coal and two mt from small surface mines.
- (8) NSM has also expanded through diversification. It bought Bison in August 1988, Britain's largest pre-cast concrete flooring manufacturer for £82.5 million.
- (9) Most surface equipment firms and employees are included under the construction and earth-moving equipment heading 3254 (SIC, 1980), and not under mining machinery (3251). Use of activity heading 3254 statistics are virtually meaningless here because surface mining equipment jobs represent only a small fraction of the total employment recorded for the four digit activity category. The estimates used in this thesis are based on information obtained from some of the major suppliers of opencast equipment based in the UK.

- (10) Aveling Barford was taken over by a management consortium in August 1988, which was pieced together by the former managing director of Grove Coles, the maker of mobile cranes. Earlier in the year there was speculation that either a Japanese firm or Daewoo of Korea would buy the company.
- (11) Almost a decade earlier the Caterpillar corporate decision-makers had a similar change of mind about Uddingston's role. Originally the Scottish plant was to be the single source for the D8 tractor. At the time the plant employed 2,500 people and single sourcing of the D8 would have prevented the redundancies that followed the decision to produce D8s in both the USA and in Scotland.
- (12) In the case of Uddingston, the plant's workforce hoped that the Scottish Office would be able to intervene either to prevent the corporation from removing capital equipment to other European plants or to find alternative work for the plant. There were suggestions that another earth-moving equipment maker would take-over Uddingston, and that Caterpillar would accept the factory as an independent sub-contractor. In the event, the British government proved unwilling to provide the necessary capital to start an independent company, and impotent in negotiations with Caterpillar's chief executives.

- (13) The decision by Caterpillar to pull out of Scotland came on top of several closures and heavy redundancies in and around the Strathclyde district. Babcock Power made 620 people redundant in Refrew in December 1986. In November of the same year, Scott Lithgow announced 1,200 redundancies at its oil rig and ship building yard at Greenock. And British Rail's engineering works at Springburn, near Glasgow, closed with the loss of 1,100 jobs.
- (14) British longwall mining suppliers are well established in Australia. Anderson Strathclyde Australia (Pty) Ltd. was formed in 1979 and a small company, A B Rea, Argenton, NSW, was taken over to design and manufacture mechanical handling plants. Dowty McCallum and Dowty Wolleng in NSW manufacture heavy-duty conveyors and powered supports. Dobson Park has subsidiaries to its mining division (Gullick Australia) and power tools division (Kango Wolf).
- (15) In the fourth quarter of 1988 there are signs that world coal prices will increase as major producers and exporters seek to increase their profit margins. Australian producers have succeeded in getting a price increase for traded steam coal to Japan's Chigoku Electric Company. This represents the first price increase since 1982, and it will effect future contracts with Japanese and Asian utilities as well as importers in the European market (FT, 04-10-88:46).

TABLE 7:1

British Coal Opencast Executive Coal Output
(million tonnes)

	1980/81	1981/82	1982/83	1983/84	1984/85*	1985/86	1986/87
BC Opencast	12.4	11.3	11.9	11.3	11.3	11.5	10.9
BC Deep Mines (incl.tip & capital coal)	102.4	101.6	98.3	84.7	27.4	84.1	84.5
Licensed (open- cast and small private mines)	0.7	0.9	1.0	1.2	1.1	1.4	1.6
Total	115.5	113.8	111.2	97.2	39.8*	97.0	97.0

Notes: * Affected by the 1984/5 national coal dispute

Source: BC Corporation Annual Report & Accounts (adjusted to
omit Scottish Area production)

TABLE 7:1 (b)

Total British Coal Opencast, including Scotland
(million tonnes)

1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
15.1	14.3	14.7	13.8	13.6	14.1	13.3	15.1

Source: BC Annual Report & Accounts

TABLE 7:2

Opencast Performance 1957 to 1987

Year	Saleable Output mt	Operating Profit M	Profit/t	Retail Price Index
1957	13.3	9	0.68	-
1966/67	6.8	8	1.09	61
1976/77	11.4	65	5.73	160
1981/82	14.3	157	10.93	301
1982/83	14.7	192	13.08	323
1983/84	14.1	211	14.97	340
1984/85	13.6	142	10.43	356
1985/86	14.1	343	24.33	377
1986/87	13.3	244	18.24	388

Taken from: Cotgrove and Weavers, 'Opencast Mining - a success story', Colliery Guardian, August 1987 : 323.

TABLE 7:3

British Coal Costs of Production
(England & Wales)

		1984/85	1985/86	1986/87	1987/88*
Opencast	/Gj	1.08	1.07	1.02	1.03
Deep mines	/Gj	3.68	1.75	1.57	1.65
Total	/Gj	2.92	1.68	1.51	1.55*

Notes: * Statistics for 1987/88 include the Scottish Area
1984/85 was affected by the national coal dispute
Gj - Giga Joule, measure of the energy content of coal
Coal of average quality contains 25 Gj per tonne.

Source: BC

TABLE 7:4

Output and employees, 1978 - 87

Year	Saleable output (000 t)	Average contractors' employees	Output per manshift (t)*
1978/79	13,801	6,267	9.6
1979/80	13,013	6,362	8.9
1980/81	15,279	6,428	10.3
1981/82	14,349	6,172	10.1
1982/83	14,701	5,814	11.0
1983/84	14,083	4,972	12.3
1984/85	13,565	4,553	13.0
1985/86	14,102	4,556	13.5
1986/87	13,292	4,579	12.6

* Assumes 230 shifts per man year

Source: Cotgrove & Weavers (1987)

TABLE 7:5

Opencast Executive - Employment, March 87

Contractors' employees	Number
Production	3,660
Preparation	737
Others	98
Contractors' Total	4,495
OCE Industrial staff	171
Non-industrial staff	939
OCE Total	1,110

Source: OCE
(excl.Scotland)

TABLE 7:6

Opencast Executive operating results

	Amount	Per tonne saleable	Percentage of total cost
	£m	£	%
Turnover	500	45.87	
(Decrease in stocks of finished goods	(5)	(0.46)	
	495	45.41	
<hr/>			
COSTS:			
1) Prospecting & boring	6	0.55	2.0
2) Production 100%	204	18.71	69.9
Coal Face 85%			
Restoration 4%			
Third Party			
Contracts 2%			
Plant Hire 1%			
Local Auth-			
ority Rates 2%			
Other Costs 6%			
3) Haulage to disposal points	12	1.10	4.1
4) Preparation, handling and stocking	38	3.49	13.0
5) Overheads & services	23	2.11	7.9
6) Site restoration	9	0.83	3.1
<hr/>			
Total Costs	292	26.79	100.0
Operating Profits	203	18.62	
<hr/>			

Notes: These results are for the year to 28th March 1987. In that year there were 38 operating sites in England and Wales. Tonnage in contract equalled 39.1 million tonnes and the year's saleable output was 10.9 mt.

Source : BC Opencast Executive (1987)

TABLE 7:7

The New Coal Companies ?

Area operating profits (losses), year ended 31/03/86

(Including re-distribution of opencast profits to deepmine areas)

Area	Underground		Opencast		Total		Profit/(Loss)
	tonnes	profit	tonnes	profit	tonnes	profit	/tonnes
	(m)	m	(m)	m	(m)	m	
Scotland	4.3	(46)	2.6	56	6.9	10	1.4
North East	9.5	(34)	2.8	88	12.3	54	4.4
North Yorks	13.9	(61)	0.0	0	13.9	(61)	(4.4)
South Yorks	12.5	11	1.5	31	14.0	42	3.0
North Derby	6.2	(26)	1.4	28	7.6	2	0.3
Notts	18.7	97	0.0	0	18.7	97	5.2
S Mids	6.2	(17)	2.7	71	8.9	54	6.1
Western	9.4	(27)	1.0	12	10.4	(15)	(1.4)
South Wales	6.6	(65)	2.1	57	8.7	(8)	(0.9)
Kent	0.5	(3)	0.0	0	0.5	(3)	(6.0)
Total	87.8	(171)*	14.1	343	101.9	172	1.7

* Before strike recovery costs

Notes: Robinson & Sykes (1987:58-59) point out that the area operating profits (and losses) for the financial year to end March 1986 were calculated on the basis that opencast sites are distributed to the areas in which they lie. Six of the then ten areas would have been profitable in the financial year 1985/6 with opencast mines included, as opposed to two which were profitable with deep mine operations only.

Taken from : Robinson & Sykes (1987)
Based on NCB Reports & Accounts

TABLE 7:8

Regional Opencast operating results
(1987/8)

OCE Region	Saleable Output (million tonnes)		Cost of Production (£ per gigajoule)	
	1988	1987	1988	1987
North East	3.5	3.2	1.04	1.02
North West	1.0	1.3	1.30	1.09
Central West	3.4	2.5	0.67	0.66
Central East	3.0	2.5	1.14	1.10
South West	1.5	1.4	1.30	1.40
Opencast Executive (England & Wales)*	12.4	10.9	1.02	1.02
Scottish	2.7	2.4	1.04	1.07
Total	15.1	13.3	1.03	1.03
Total British Coal, including deep mines	96.9	100.5	1.55	1.53

* In Scotland opencast mining operations and collieries were the responsibility of the Scottish Area's management

Source : British Coal Report and Accounts (1987/8)

TABLE 7:9

Opencast Contractors and Equipment Suppliers

Main Contractors Parent Company	Firm
Burnett Hallamshire Holdings Plc (MINCORP)	Northern Strip Mining McKerlain Plant Ltd.
Taylor Woodrow	Taylor Woodrow Construction
Charter Consolidated Plc	Lehane, Mackenzie & Shand Ltd
Derek Crouch Plc *	Derek Crouch (Contractors) Ltd.
Consolidated Goldfields Plc	ARC Ltd.
BET Group	Murphy Brothers Ltd.
George Wimpey Plc	Wimpey Construction Ltd.
Amec Plc "	French Kier Construction Fairclough Parkinson Mining
A.F. Budge (Contractors) Ltd.	-
James Miller & Partners Ltd.	-
Mowlem Group Plc	Lomount Construction
Trafalgar House	W.J. Simms, Sons & Cooke Ltd
Costain Mining	-

* Now part of Ryan International

Source: Whitfield, Capital and Class, Spring 1985,
and Guide to the Coalfields 1988.

TABLE 7.10

Plant used on two comparable UK opencast sites

Site	Togston			Godkin		
Location	Northumberland			East Midlands		
Contractor	Derek Crouch			Northern Strip Mining (NSM)		
Total Tonnage	1.7 million tonnes			2.6 million tonnes		
Weekly Production	7,000 tonnes			6,500 tonnes		
Major Equipment Item	Supplier	Make	Size	Supplier	Make	Size
Draglines	1 x BE	1150B	21 m ³	2 x R&R	W 600	11 m ³
	1 x Marion	7800	23 m ³	1 x R&B	71	3.5m ³
Dump Trucks	5 x CAT	777	36.3m ³	3 x Wabco	170 T	57 m ³
	14 x CAT	773	23.4m ³	6 x Terex	33/11	34 m ³
Face Shovels	1 x RB	1958	9 m ³	(Hydraulic face shovels)		
	1 x RB	150	4.5m ³	1 x O&K	RH300	22 m ³
Coal Shovels	2 x O&K	RH 6	0.8m ³	1 x CAT	245	3.1m ³
	1 x RB	220RS	0.8m ³	(Hydraulic coal shovels)		
				3 x O&K	RH9	1.5m ³
				(Backacters)		
				1 x O&K	RH6	0.7m ³
				1 x Hymac	580	0.7m ³
				1 x O&K	RH75	7.5m ³
				(Scrapers)		
				3 x Terex	TS24	18.4m ³

Notes: BE - Bucyrus Erie O&K - Orenstein and Koppel
RB - Ruston Bucyrus R&R - Ransome and Rapier
CAT - Caterpillar

Bucket capacity m³ - cubic metres

Source : Kelly (1984).

TABLE 7:11

Equipment in use on NCB opencast coal sites
(March 1985)

Item	Supplier/Make	Number supplied
Draglines (Total number in use = 56)	Bucyrus Erie Lima Manitowoc Marion *Ransome & Rapier Ruston Bucyrus	7 19 8 8 7 7
Large Rope shovels (75)	Bucyrus Erie Lima Marion P & H Ruston Bucyrus	4 6 8 4 53
Dump Trucks (595)	*Aveling Barford Caterpillar Euclid Komatsu Lectrahaul Terex Wabco	60 140 56 10 30 296 3
Large Hydraulic Shovels (70)	Caterpillar Demag Liebherr O & K Poclain P & H	29 10 3 20 5 3
Large Wheeled Loading Shovels (22)	Caterpillar Michigan	19 3

* Major British suppliers

Source : Kelly (1987)

TABLE 7:12

British-based Opencast Equipment Suppliers

Company	Location	Main Products
Bamford Excavators	Rocester, Staffs.	Earthmoving machinery, excavators, e.g. JCB excavator / loader range & wheeled loading shovels
Aveling Barford Ltd.	Grantham, Lincs.	Articulated and rigid dump trucks, wheeled loaders, graders, and compaction equipment.
Ruston-Bucyrus Ltd.	Lincoln.	Draglines, excavators, shovels, lifting cranes.
Priestman Bros. Ltd.	Hull, N.Humberside	Hydraulic excavators, crawler cranes, rope operated excavators & drag lines, grabs.
Ransomes & Rapier (taken over by Stothert & Pitt)	Ipswich, now Bath in Avon	Various kinds of earth-moving equipment, walking draglines.
Artix	Peterlee.	Dump trucks. Many sold to Caterpillar.
Matbro Bray Ltd.	Tetbury, Glos.	2 & 4 wheel drive front end loaders, fork lift trucks and materials handling equipment.
Brown International	Pool, North Yorks	Wheel loaders, dump trucks and excavators.

Some distributors in the U.K. of foreign equipment

Saville Tractors Ltd.	Stratford-upon-Avon	Crawler dozers, loaders, excavators, shovels, etc. Dresser, Hymac, M.A.N.
Finning Ltd.	Cannock, Staffs.	Complete range of Caterpillar equipment.
Marunbeni-Komatsu	Redditch, Worcs.	Suppliers of range of opencast equipment.

Source : Guide to the Coalfields, 1988 Note: Not full list.

TABLE 7:13 (a)

World Recoverable Coal Reserves

(Billion short tons)

Country	Recoverable reserves	World total % age
USA	283.41	28.7
USSR	264.88	26.9
China PR	108.90	11.0
Australia	72.42	7.3
West Germany	71.64	7.3
South Africa	57.03	5.8
Poland	43.20	4.4
Yugoslavia	18.23	1.8
Canada	6.51	0.7
Czechoslovakia	6.15	0.6
Other countries	54.35	5.5
World Total	986.72	100.0

Source: Coal Age

TABLE 7:13 (b)

Hard Coal Production by Country

(million tonnes)

Country	MT	1980 Share %	MT	1984 Share %
Total	2 728	100.0	2 996	100.0
USA	710	26.0	751	25.1
China PR	596	21.8	736	24.6
USSR	493	18.1	485	16.2
Poland	193	7.1	192	6.4
S Africa	116	4.3	162	5.4
India	109	4.0	142	4.7
Australia	74	2.7	125	4.2
UK	130	4.8	51	1.7
W Germany	94	3.4	83	2.8
Others	215	7.9	269	9.0

Note: Figure for UK in 1984 is low because of miners' strike

Source : UN Monthly Bulletin of Statistics

TABLE 7.14

Proportion of Surface Mined Output, 1985

Country	Hard coal m/tonnes	Brown coal and lignites m.t.	Surface mined proportion
China	785	62	7
USA	743	61	68
USSR	566	160	44
DR Germany	-	300	100
Australia	129	39	75
South Africa	173	-	42
FR Germany	89	121	42
Poland	191	58	23
India	150	8	46
UK	94	-	12
Total	2,920	809	
World Total	3,171	1,188	

Note: UK total for 1985 includes the first quarter of that year, which was the end of the coal dispute. The total output for the NCB financial year 1985/86 was 104.5 million tonnes, including 14.1 m.t. opencast and some two m.t. from licensed operators.

With the exception of the UK, all the above countries are major markets for opencast coal-mining equipment. The People's Republic of China has a huge coal industry, and although the surface mined proportion is small it is still a significant market for the world's surface excavation plant makers.

The Democratic Republic of Germany is supplied by Soviet and other Eastern Bloc producers of surface machinery, although it does import some machines from the West, particularly from West Germany. A similar story applies to the Polish market.

Source : British Coal International.

TABLE 7:15

Product strengths and weaknesses in export markets
for mining equipment

Strengths	Weaknesses
<ul style="list-style-type: none">- shearers- hydraulic roof supports- armoured face conveyors- stage loaders- belt conveyors- conveyor belting- roadheaders- rail transport systems- pumps- compressors- flameproof equipment- monitoring; control; and signalling equipment- The design, manufacture and installation of coal preparation plants	<ul style="list-style-type: none">most items of opencast machinery for large-scale sitessoft rock mining consultancyroom and pillar mininglignite mininghard rock mining

Notes: The above list was compiled by NEDO's Economic Development Committee on the Mining Machinery Industry, and is based on their interviews with UK manufacturers. The products and areas of expertise in the left hand column are where British firms were competitive in most aspects, viz technology, price, delivery and service. The right hand column indicates general areas where British export performance is weak mainly due to the lack of a significant home market base.

Source : NEDO (1985)

TABLE 7:16

Surface and Underground Export Sales by ABMEC Members (£m)

	1977	1978	1979	1980	1981	1982	1983	1984
Surface	27.7	35.8	20.1	21.7	47.5	50.3	28.9	48.9
Under-ground	60.0	55.6	162.0	106.9	85.2	118.9	92.6	147.3
Total	87.7	91.4	182.1	128.6	132.7	169.3	121.5	196.2

Notes: The value of surface and underground exports from 1984 to 1988 is not known by the author, but some percentages of total exports are known. In 1986, surface mining equipment exports were 18 per cent of the total compared to 82 per cent for deep mining equipment.

It should be added that the above statistics for surface export sales includes coal preparation plant and surface haulage equipment which is also used at collieries (on the surface). Nevertheless, the figures underestimate total surface equipment sales because some UK-based suppliers of excavation plant are not members of ABMEC. Furthermore, some of the exports given above were to other minerals industries, such as copper and tin mining in Africa, Latin America, and Asia-Pacific countries.

Source : ABMEC and NEDO.

TABLE 7.17

Rate of Installation of New Longwalls in the USA

1962-64	1
1965-67	1
1968-70	7
1971-73	4
1974-76	8
1977-79	24
1980-82	34
1983-85	30

Source: Coal Age.

TABLE 7.18
Production from Longwall Faces, Australia
('000 tonnes raw coal)

	New South Wales		Queensland		Australia	
	Total	Per cent of underground production	Total	Per cent of underground production	Total	Per cent of underground production
1978-79.....	1 624	4.3	-	-	1 624	3.7
1979-80.....	1 500	4.2	-	-	1 500	3.7
1980-81.....	2 172	5.0	-	-	2 172	4.4
1981-82.....	3 387	7.6	-	-	3 387	6.7
1982-83(a) ..	4 880	10.5	-	-	4 880	9.2
1983-84.....	6 446	15.1	-	-	6 446	13.1
1984-85.....	8 513	20.2	-	-	8 513	17.5
1985-86.....	11 647	25.9	-(b)	-	11 647	22.4
1986-87.....	16 567	32.0	1 225	20.7	17 792	30.0

(a) 53-week year.

(b) Production commenced June 1986, tonnage not available.

Source: Australian Coal Association.

TABLE 7:19

British Mining Equipment Export Performance :
Sales by UK to different geographical areas (£ million)

Rank	Country	Sales 1980	Country	Sales 1981	Country	Sales 1982
1	China	26.5	USA	24.7	Australia	34.2
2	USA	24.0	Australia	16.2	USA	32.2
3	S.Africa	9.8	India	15.4	S.Africa	27.1
4	Canada	6.9	S.Africa	13.2	India	16.1
5	Australia	6.2	Zambia	6.7	Canada	10.9
6	Bel/Lux	4.2	Canada	5.1	Jamaica	10.6
7	Egypt	3.6	Mexico	4.6	France	4.0
8	France	3.5	France	3.8	China	4.0
9	Mexico	3.4	Bel/Lux	3.7	W.Germany	3.3
10	India	3.3	Iraq	3.7	Bel/Lux	3.0
11	W.Germany	3.2	Turkey	3.2	New Zealand	2.5
12	Spain	3.0	W.Germany	2.7	Mexico	2.5
World Total		128.6		132.8		169.3

Note: Export figures exclude a large amount of machinery made by subsidiary companies abroad. This helps to get round problems such as laws insisting on local manufacture and import duties. Exports have increased in the 1980s, partly as a response to reduced demand from British Coal.

Source : ABMEC

TABLE 7:20(a)

UK Underground Mining Equipment Exports 1983/4 (£m)

Country	Value in £m
USA	45.10
China	33.26
Australia	21.27
South Africa	21.20
Indonesia	20.49
Canada	14.57
India	14.13
Total EEC & W Europe	29.59
Comecon Countries	8.28
Other Americas	12.00
Other countries	19.92
Total World	239.81

TABLE 7:20(b)

The Top Ten Countries for ABMEC Members' Export Sales in 1986

Position	1986 £m	Country	1985 £m	Position
1	47.85	USA	56.9	1
2	22.26	Canada	14.5	3
3	19.06	Australia	13.2	4
4	18.26	India	11.8	6
5	9.14	S. Africa	22.1	2
6	8.00	Israel	5.1	-
7	4.78	Turkey	11.6	7
8	3.52	Bulgaria	0.1	-
9	3.38	Ghana	1.6	-
10	3.24	Chile	4.8	-

Note: In previous years China has featured in the top ten rankings. Indonesia has also been a major market for British suppliers in Asia. Some of the above countries appear in the rankings on account of very large orders in 1986, but they are not necessarily major markets for British suppliers in other years.

Source : ABMEC

TABLE 7.21
World Coal Export Trade, 1985-1986
(million tonnes)

	1985			1986		
	Metallurgical	Steaming	Total	Metallurgical	Steaming	Total
Exporters -						
United States...	54.7	29.3	84.0	49.8	27.8	77.6
Australia.....	49.8	38.1	87.9	48.7	43.3	92.0
South Africa...	4.8	40.1	44.9	5.2	38.8	44.0
Canada.....	22.5	4.9	27.4	22.4	4.8	27.2
Colombia.....	0.4	3.3	3.7	0.6	5.0	5.6
West Germany...	5.7	3.1	8.8	5.0	2.3	7.3
United Kingdom.	0.1	2.4	2.5	0.1	2.7	2.8
Poland.....	10.3	25.8	36.1	9.8	25.5	35.3
USSR.....	10.5	13.4	23.9	12.1	13.3	25.4
China, PR.....	3.0	4.8	7.8	3.2	6.7	9.9
Others.....	3.2	5.6	8.8	3.2	5.8	9.0
Total.....	165.0	170.8	335.8	160.1	176.0	336.1
Seabourne.....	141.0	132.4	273.4	137.1	139.4	276.5

Notes: Australia will remain a major exporter in the 1990s, although its home coal industry has been hit by the low level of international coal prices and by an industrial dispute in 1988. Although South African producers have been adversely affected by political embargoes on its coal exports considerable amounts of South African coal continue to be traded on world spot markets, including the ARA, as well as with East Bloc nations. The USA will continue to be one of the "big three" exporters throughout the 1990s, although its coals are more expensive than most traded coal from Australia and South Africa, and exports are unlikely to increase while prices remain below US \$45 per tonne. China is the major new entrant on world coal markets in the 1980s, but it is unlikely to be a big exporter until the late 1990s. China has a huge internal market demand to satisfy and has had problems keeping to its existing export commitments, partly due to the slow development of its export infrastructure. Like Poland, foreign exchange rather than profit is the main motive for exports to the West.

Source: Chase Manhattan Bank (1987).

FIGURE 7:1
THE 'EXPOSED' COALFIELDS



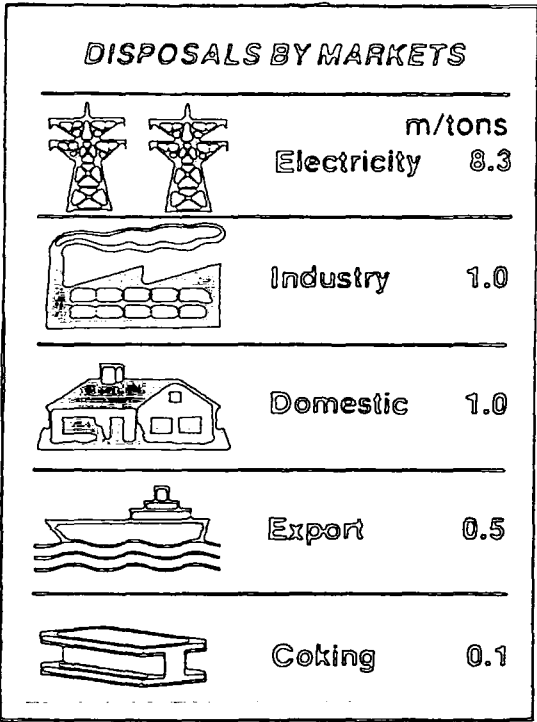
Areas of shallow deposits of coal



Source : Department of the Environment (1988)

FIGURE 7:2

UK Opencast Coal Markets

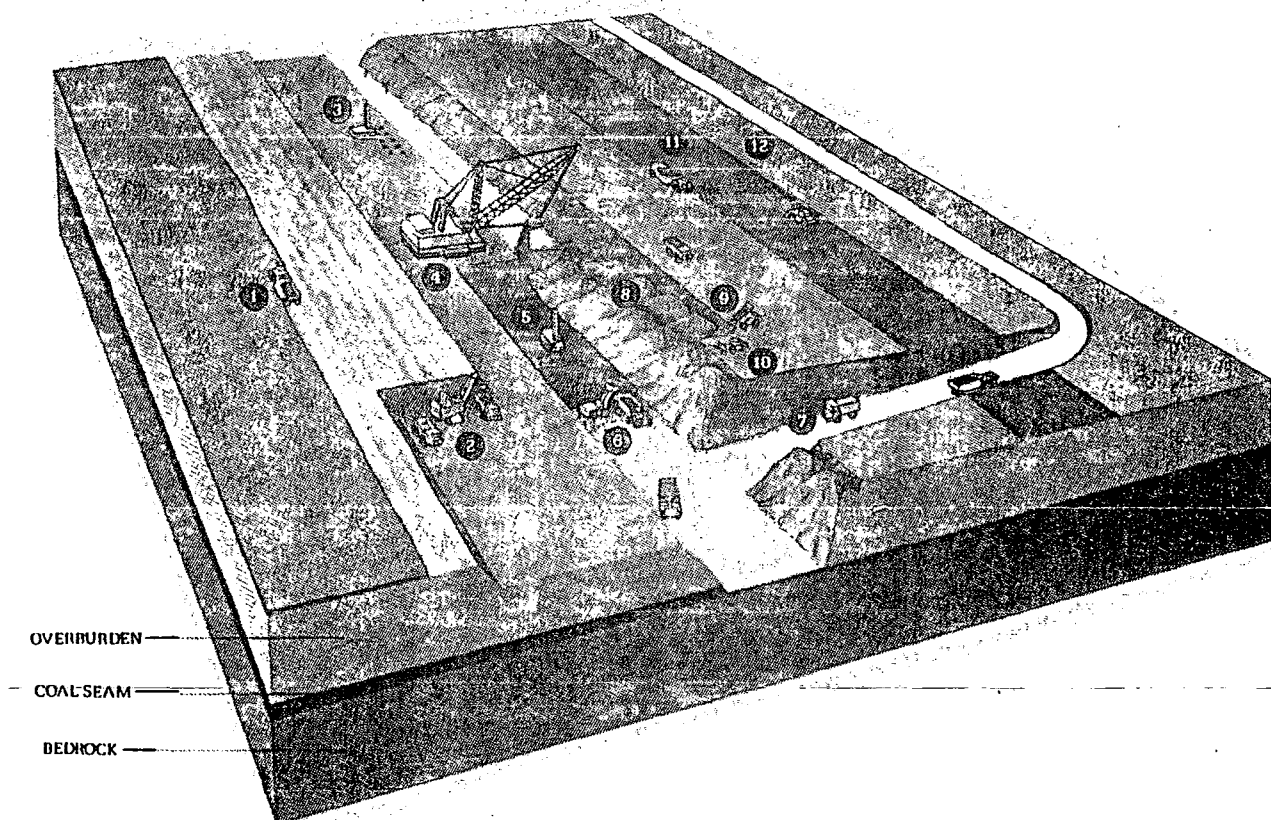


Source : Opencast Coal Executive.

FIGURE 7:3

STRIP MINING SEQUENCE (SCHEMATIC)

1. TOPSOIL STRIPPED AHEAD OF THE MINING OPERATION IS USED IN SUBSEQUENT REHABILITATION
2. PRE-STRIPPING WITH A FACE SHOVEL AND TRUCKS FORMS A BENCH ON WHICH THE DRAGLINE IS POSITIONED
3. DRILLING AND BLASTING OF THE DEEPER, CONSOLIDATED OVERBURDEN
4. DRAGLINE REMOVES THE DEEPER OVERBURDEN TO EXPOSE THE COAL SEAM
5. DRILLING AND BLASTING MAY BE REQUIRED TO LOOSEN THE COAL SEAM
6. COAL IS LOADED INTO LARGE, OFF-ROAD TRUCKS FOR TRANSPORT TO THE PREPARATION PLANT
7. SPECIALISED TANKERS REGULARLY SPRAY ALL HAULAGE ROADS TO CONTROL DUST EMISSIONS
8. PARALLEL, SAW-TOOTH SPOIL PILES LEFT BY THE DRAGLINE
9. IN-FILLING OF DRAGLINE SPOIL PILES WITH PRE-STRIP OVERBURDEN
10. RESHAPING OF SPOIL SURFACE TO PRODUCE A PRE-PLANNED LANDFORM
11. REPLACEMENT OF TOPSOIL PREVIOUSLY STRIPPED AHEAD OF THE MINE
12. REVEGETATION IS COMPLETED IN INCREMENTS ROUGHLY EQUAL TO THE AREA DISTURBED BY MINING EACH YEAR



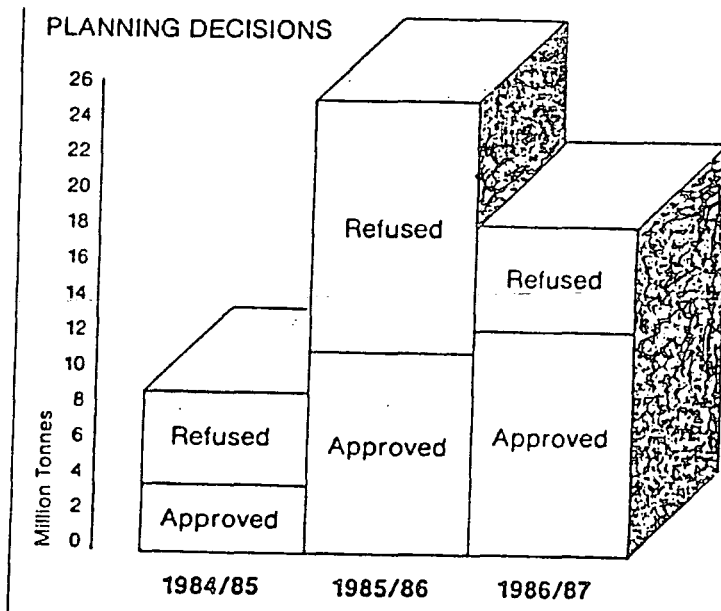
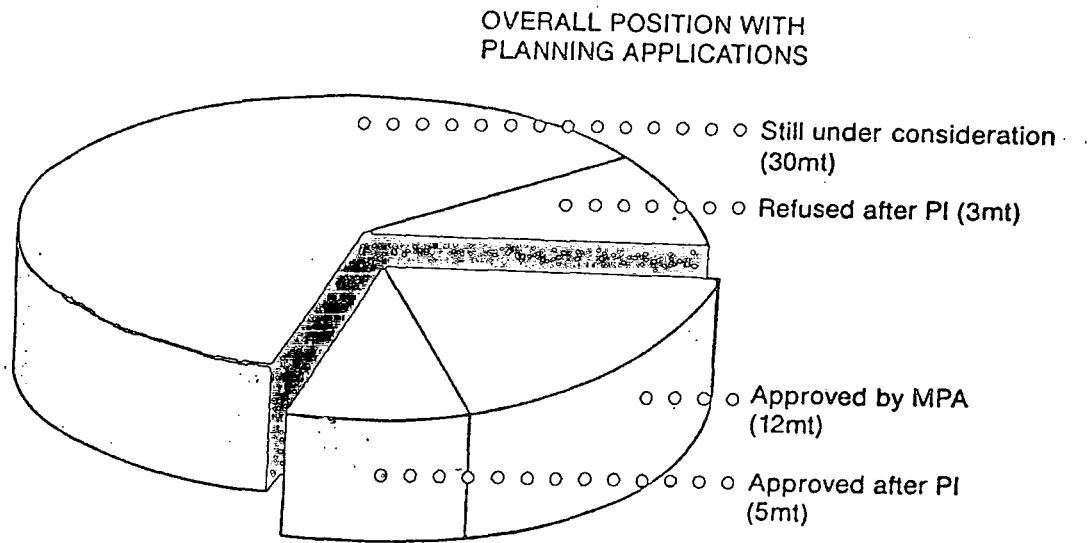
Open Pit and Strip Mining Methods

Surface Mining accounts for an increasing proportion of world coal output. In Australia and the U.S.A. it accounts for well over half of total production. In U.K. it accounts for around 14 per cent of production, and that is taken from relatively small opencast sites. The above diagram shows a strip mining sequence, although many of the major items of equipment used are of similar types to those used in U.K. opencast operations. The depth limit to which it is economic to mine a deposit is determined by comparing the quantity of "overburden" (topsoil and overlying strata needing removal to gain access to the coal) with the quantity of coal to be obtained as a result. The thicker the seam, the greater the depth at which it can be mined economically, within the limits of equipment capacity. "Strip" mining is generally used to recover a single, horizontal seam up to depths of 60 metres, while "open pit" mining is applied to multiple seams, and can extend to greater depths.

Source: Australian Coal Commission

FIGURE 7:4

Opencast planning permission refusals and approvals, 1984-87

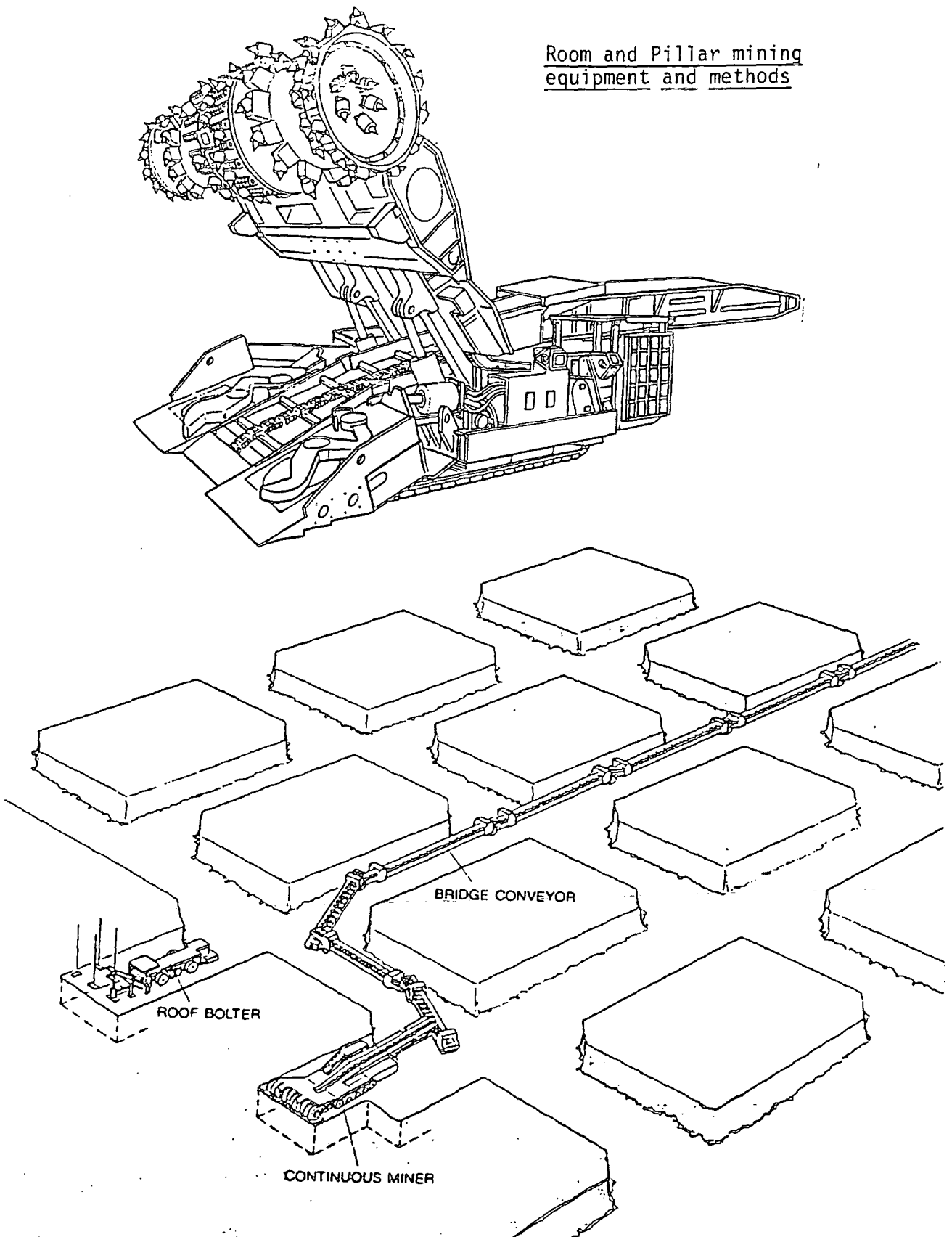


Notes: In spite of frequent BC and contractors' propaganda that opencast mining is falling to lower output levels due to failures to gain approval for new sites at public inquiries (PI), 1986/7 was a highly successful year for the OCE (1). It gained permission to work 17 mt of coal from 14 sites, mostly approved directly by Mineral Planning Authorities (MPA). The level of new planning proposals has been high since 1984/5.

Source : Opencast Executive.

FIGURE 7:5

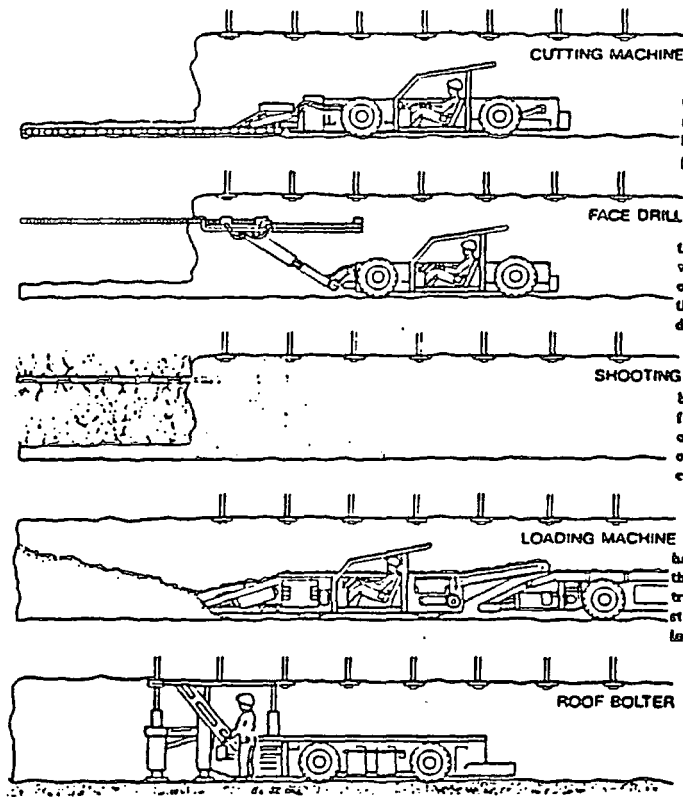
Room and Pillar mining
equipment and methods



CONTINUOUS MINING MACHINES, which first appeared in 1948, also operate in a room-and-pillar mine layout. The machines fracture coal from the face of the seam and load it in a single step. Modern continuous miners are built in several sizes to operate in seams that range from two to 10 feet in thickness. The most widely adopted machines have a rotating drum studded with cutting bits that dig into the coal face. The drum is driven into the top of the seam and travels downward. Gathering arms push the fallen coal onto a central conveyor that discharges the coal onto a haulage system, such as a shuttle car or an extensible conveyor belt coupled to the rear of the continuous miner. After the mining machine has advanced about 20 feet it is withdrawn and moved to another face so that the freshly exposed roof can be bolted. Continuous mining machines now account for about 65 percent of all coal mined underground.

FIGURE 7:6

Room and Pillar mining equipment and methods

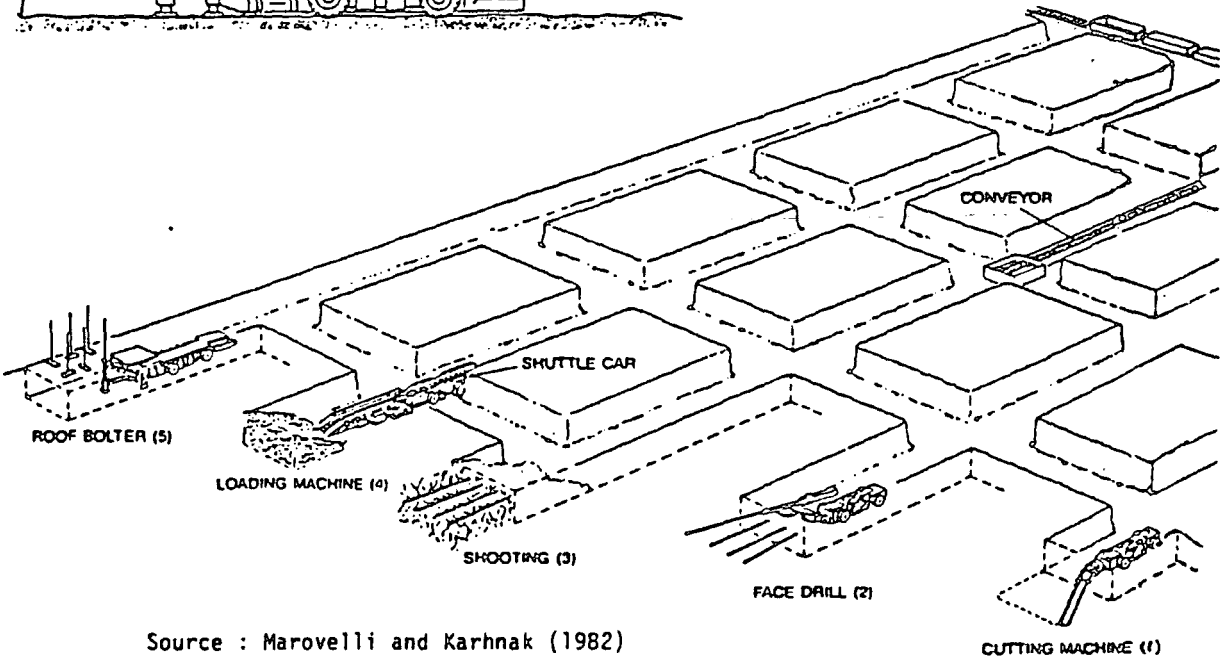


ROOM-AND-PILLAR MINING has been the standard method of underground coal mining in the U.S. since the 19th century. The rooms are empty areas from which coal has been removed; the pillars are blocks of coal from 40 to 60 feet on a side, left standing to support the roof of the mine. In the final stage of the mining of a seam

the coal in the pillars can be extracted, allowing the roof to fall. In conventional mining, diagrammed at the left, five operations are carried out in sequence. Typical machines for the operations are shown at the right. In the first step a slot roughly six inches high and 10 feet deep is cut across the base of the seam by a machine with a long cutter

bar. A series of holes, also about 10 feet deep, are then drilled in the face of the coal above the slot and are loaded with explosives. The detonation of from 10 to 15 pounds of explosives fractures up to 50 tons of coal, which spills out onto the floor of the mine. A loading machine conveys the shattered coal into a waiting shuttle car, which

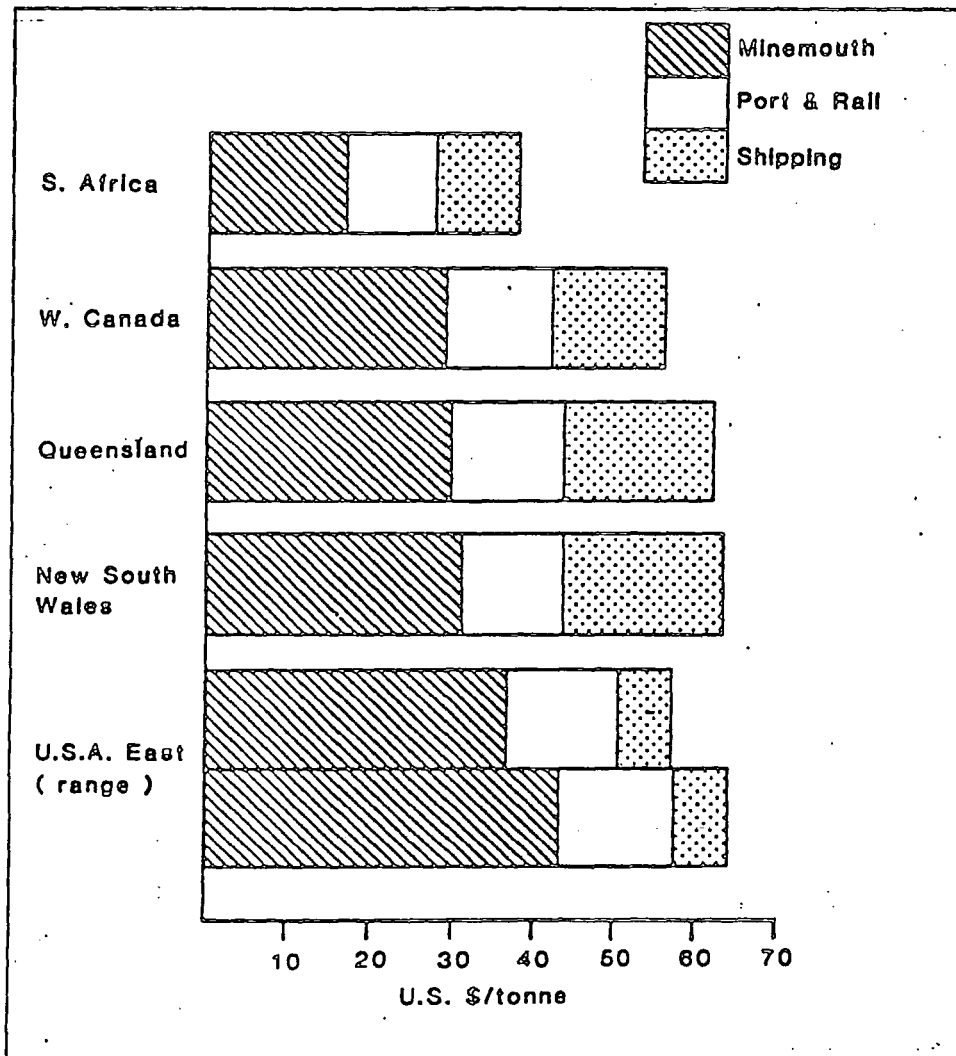
hauls the coal to a belt conveyor. The belt in turn carries the coal to the main haulage line (which can be another belt or a rail line) for transport from the mine. The final step is to insert a series of long steel bolts into the roof in order to bind the overlying layers of shale into a strong laminate. The sequence of operations is then repeated.



Source : Marovelli and Karhnak (1982)

FIGURE 7:7

Delivered cost of steam coal to ARA, 1982
(US \$/tonne)



Notes: This figure shows the variable costs of internationally traded steam coal from different sources to the Amsterdam-Rotterdam-Antwerp (ARA) spot market in 1982. Between 1982 and 1987 world coal prices fell. The CEEB was paying between US\$33.50-36.50 on its spot tender in the summer of 1987. Producers in North America and Australia face higher port and rail charges than South Africa. Some claim that they have made losses due to very low fuel prices, and it is likely that pressures to increase international coal price levels will be irresistible if coal demand increases in the 1990s.

Source : NCB Sizewell Evidence.

CHAPTER EIGHT

MULTINATIONALS, MONOPOLIES AND THE UK ENERGY SECTOR

'Our commitment to competition means that we are also looking at ways of liberalising coal production within the United Kingdom. Coal is not a natural monopoly. There is no justification for locking out private sector investors. Why should we forbid the private sector from creating new jobs in British mining? The fact is that privately mined coal is just as British as state mined coal' (author's emphasis). This is an extract from a speech by Cecil Parkinson, Secretary of State for Energy, at the Annual Conference of Mining Engineers, Pembroke Hotel, Blackpool, 13 May 1988.

The assertion that privatisation would not alter the "British" status of coal production needs closer analysis. It requires an investigation to assess who are likely to be controlling production, marketing and profiting from coal sales after the so-called liberalisation of the UK coal market, and after partial, if not complete, privatisation of coal mining itself. This chapter is speculative in the sense that a full-scale privatisation of the industry is unlikely until and if the Conservatives win another General Election in the early 1990s. Nevertheless, the shape of the coal industry may well be affected as much by the imminent privatisation of the electricity supply industry (ESI) as by a change of ownership of the mines themselves (see Dewhurst & Gladstone, 1988). At the current rate of pit closures there may be very little of the industry left to privatise by the mid-1990s.

A number of private corporations have already started to diversify their energy industry investments and increase their activities in the UK in preparation for the impending privatisation of the ESI, and some

multinational corporations have hinted to the government that they are interested in buying slices of British Coal. A variety of corporate interests could become involved. They span mining, mining equipment, fuel trading and distribution, power plant supply, constructing and operating power stations. In addition, some corporations may decide to disinvest from their activities related to deep coal mining in the UK, which does not have many prospects of expansion and is likely to continue its long-run contraction into the 1990s. In particular, current engineering suppliers of underground machinery are unlikely to maintain profitable production when most government policies favour overseas coal producers and opencasting (see chapters six, seven and concluding chapter).

Another aspect of government thinking that should be critically assessed is the view that by privatising an industry there will be increased efficiency through competition between firms in the market place. In fact, there is no such thing as a perfectly competitive market and reliance on the ambiguous term "market forces" can be misleading. As Prior and McCloskey (1988:95) noted:

'A great deal of nonsense is talked about opening up the industry to "market forces" as though this provided an adequate and unique description of the future pressures to which the industry is to be subjected. In practice, most domestic energy markets are, in some form or another, organised cartels; the problem lies in deciding what kind of cartel will impact on the British coal industry in the 1990s.'

At present the UK energy sector is controlled by big state-owned corporations in electricity and coal, and by large MNCs with diverse energy holdings in many parts of the world. Removal of the

nationalised element would not necessarily reduce monopoly powers, and in some cases may actually reinforce them. The strengthening of monopoly has resulted from the privatisation of British Gas, as Robinson and Sykes observed:

'British Gas triumphed. It achieved a form of privatisation uniquely favourable to its management which permitted large increases in salaries, removed Treasury interference in its affairs, and all without the tiresome intrusion of competition' (quoted in FT, 25-01-88: 'Electricity Survey').

They suggested that a similar fate may await the electricity supply industry, particularly if the privatised companies retain most of their monopoly of information about electricity generation. Simply allowing the industry to be controlled by private capital in the interests of shareholders will not necessarily make it more competitive because considerable elements of monopoly power will remain (1). One fact is certain, the privatisation of power supplies will increase pressures on British Coal to reduce its costs in the short term, and political pressure on the industry to prepare for its own market flotation. As noted in earlier chapters, the corporation has already introduced several measures that seem to be leading towards eventual privatisation either as a single entity or on an area-by-area, or even super pit-by-super pit basis.

The dividing line between public sector and private sector investments is not always clearly defined. Big supra-national energy cartels such as OPEC include numerous sovereign state interests and nationalised industries. Numerous oil companies are state owned. Once an industry is privatised there is no guarantee that large

foreign-owned MNCs or even foreign state-owned corporations will not become major shareholders.

There are further difficulties with another professed aim of privatisation - i.e. the reduction of state interference in the workings of the economy. Here the state faces one of its greatest dilemmas, because state support is essential to maintain a civil nuclear programme. It is highly unlikely that nuclear power plants would operate profitably within a privatised framework. Nuclear stations require very long-term commitments owing to the problems of plant maintenance, safety procedures, decommissioning and waste management (see concluding chapter). Put simply, it is the state and taxpayers' money, rather than the "invisible hand" of the market, that would guide and allocate resources in the nuclear industry.

The following section considers the major corporate interests which are likely to benefit from current efforts to privatise the last remaining state owned industries in the UK energy sector. The government argue that by privatising electricity and by liberalising the coal market they are opening up the energy sector to competitive forces, which will make these industries more responsive to consumers and more economically efficient. On the basis of considerable research, the author disagrees with many of the government's arguments, especially in relation to the coal industry, which is likely to shrink to a core of capital-intensive super pits and opencast mines as a direct result of import penetration (see concluding chapter). This strategy has many failings, not the least of which is that it is likely to increase Britain's dependency on overseas fuel supplies. It is true that a much reduced coal industry comprising the most productive

capacity is likely to be profitable, but whether or not the profits are channelled into the long-term development of British coal reserves will depend largely on the corporate strategies of whichever companies own the industry and upon the vagaries of international fuel markets.

8.1 Multinational interests and foreign investment in the UK energy sector and coal industry

Privatisation will create investment opportunities for MNCs in the UK energy sector. Current government policies favour big corporate interests more than other sections of private capital. Not all of these international interests in the energy market are British owned and none of them holds purely UK energy investments. This raises the issues of security of energy supplies and public accountability. As noted in chapter seven, the international trade in steam coal is dominated by a few giant MNCs and energy conglomerates, which makes it very difficult for individual nation states to control their energy supplies, especially if they are highly dependent on fuel imports. The UK is not import dependent but current policies will increase import penetration and enhance the control of MNC traders.

It is important to identify which corporate interests are likely to gain shares of the privatised electricity industry, and possibly the privatised coal industry. Even if coal mining remains a state owned activity there are likely to be big opportunities for private investment outside British Coal, in the opencast industry, and in the coal trade (see chapter seven). Senior managers within British Coal are now talking freely of the potential benefits privatisation will

have on the industry, and the language of the market place underscores many corporate policies in the late 1980s. Some industrial analysts believe that BC ought to be split up before the privatisation of the ESI so that electricity suppliers have more than one major domestic source of coal. The argument is that generating authorities will want to diversify their sources of fuels. If the pits are owned by a single corporation, the only way in which they can do this is by importing (FT, 19-10-88:25).

The Centre for Policy Studies (1987) has already called for the sale of British Coal on an area-by-area basis to attract "the best national and international companies." Presumably the authors are referring to the leading oil companies and big international mining houses. This is understandable because one of the co-authors of the report, Allen Sykes, is both a senior adviser to a large North American electricity utility and coal mining company, and managing director of Consolidated Gold Fields (Robinson & Sykes, 1987).

The government has already indicated that foreign investors are welcome to invest in the British power market. In March 1988, Michael Spicer, Undersecretary of State for Energy, announced to the South Electric Exchange conference in Miami that US power utilities are welcome to operate power plant in the UK (FT, 28-03-88:9). This was endorsed in the House of Commons by Cecil Parkinson, Energy Secretary, who suggested that US utilities would find the UK regulatory system "less restrictive" than the US counterpart (FT, 29-03-88:7). Conservative ministers have also held discussions with senior executives of South African mining corporations, such as Rand Mines and Gencor. Even if South African direct investment in the British energy

sector is deemed to be politically unacceptable, it is likely that privatisation may result in an increase in the quantity of South African coal finding its way to British electricity suppliers. Certainly South African businesses will seek to increase their investments in Europe before the establishment of the European single market in 1992.

A diverse range of corporations are preparing for the sale of the ESI and some are already taking advantage of the opening up of the coal market. They include several private mining groups, international mining concerns and the civil engineering contractors on BC's OCE sites. Ryan International is one of the most active mining groups in Europe (see chapter seven). In July 1988, Ryan won the largest long-term opencast contract awarded by BC to extract 15 million tonnes of fuel from an OCE site at Dalquhandy in the Scottish lowlands. Ryan's subsidiary, Crouch Mining, has over 24 mt of coal under contract in Scotland, the Midlands and North East England. Ryan is one of several operators interested in buying parts of British Coal. Other companies like Budge, NSM, Amax and McAlpine have the capability to gain from opencast mining and coal imports owing to their overseas coal investments. NSM is one of the most active with opencast mines in Pennsylvania, Colombia, the Philippines, an anthracite operation at Grosselies in Belgium and lignite interests in Northern Ireland.

Joint ventures between UK and foreign coal companies can also be anticipated. Consolidated Gold Fields is a UK based company with substantial international mining interests. It has recently been involved in a complex takeover bid by MINORCO, which in turn is controlled by Anglo American and De Beers, two key companies in Harry

Oppenheimer's South African mining and minerals empire. Gold Fields operates an opencast mine in the UK through its subsidiary, ARC, producing around 100,000 tonnes a year, and it is part of a venture with Ryan to recover coal from old tips in South Wales and Staffordshire. Gold Fields was also part of Ryan International's consortium which put in a bid for the Rogerstone power plant in South Wales (see chapter seven). More significantly, Gold Fields have a 49 per cent stake in Newmont Mining of the UK, which in turn has a 50 per cent share of Peabody, America's largest coal producer. Peabody works 79.2 mt per year and had profits of \$74 million making it similar in size to British Coal. Peabody and ARC have jointly tendered without success for contracts to work opencast mines in Britain.

Diverse engineering groups like Gullick Dobson (Dobson Park Industries), Hawker Siddeley, NEI and GEC could invest in coal mining operations if given an opportunity to. But it is highly unlikely that any mining engineering company supplying underground equipment will invest in the coal industry. The most likely scenario is that they will reduce their existing stakes in the British mining industry rather than seek to increase them. Mining suppliers have had a poor decade due to much reduced demand from their major customer - British Coal. It is only a matter of time before some of the big corporate groups with mining machinery holdings decide to either reduce them or sell them altogether (see concluding chapter, section 9:1).

The position for all mining equipment concerns is by no means clear due to the diverse portfolios of their parent or holding companies. An example of this is Charter Consolidated, which owns mines in other countries and mining machinery interests in the UK.

Like Gold Fields, Charter has strong South African links. It was founded in 1965 by the merger of three companies - the British South African Company, the Central Mining and Investment Corporation, and the Consolidated Mines Selection Company. The Anglo American Corporation of South Africa became the largest shareholder in Charter after merger (MMC, 1982:Ch.3).

Coal only forms a small part of Charter's total business (Table 8:1). But the corporation has the capital to invest in British mining. In the early 1980s Charter took over two mining machinery interests - Perard Investment Holdings and Anderson Strathclyde. It also purchased Alexander Shand from British Petroleum (BP), which gave it a share of opencast mining operations in both the UK and in the USA through Shand Mining Incorporated. Charter's takeover of Anderson Strathclyde aroused much opposition in Scotland from unions and local authorities, due in part to its South African links and its asset-stripping reputation (2). But the significant aspect of Charter's take-over is not its South African investments because Anderson had long been doing business in South Africa. The main concern of local authorities and unions was the diminution of local control. Charter's interests are global. Although Anderson is an autonomous company within Charter there remains the possibility of sudden plant closure, rationalisation or another change of ownership if its mining machinery business does not perform to expectations (see concluding chapter).

Mining machinery companies are put in a difficult position by the government's privatisation policies. If one of the main consequences of private ownership is further deep cuts in British Coal's productive capacity, they are likely to be among the losers. On the other hand,

there are undoubted opportunities for some of the larger, more diverse engineering groups to invest in both power stations, and possibly the mining industry as well. Companies like NEI and Hawker Siddeley with subsidiaries in the mining supply industry are involved in consortia interests seeking to build, own and operate private power stations. Nevertheless, an increase in fuel imports due to the liberalisation of the UK coal market will adversely affect virtually all the operations of subsidiaries in the mining machinery business.

The most likely beneficiaries of both privatisation of the ESI and coal imports are the big oil companies. They include giants like Shell and BP, which have diversified out of oil into gas and coal whilst maintaining their stronghold in the global petroleum industry. Neither Shell nor BP owns or operate coal mines in the UK. BP sold its opencasting interests to Charter, and Shell's only direct link with mining in the UK is a 50 per cent stake in a British mining engineering concern. Nevertheless, both corporations are in a good position to capitalise on the opening up of UK energy markets to outside investment and fuel imports. Both BP and Shell have offered old refineries, sited on the Thames and the Tees respectively, as potential locations for major coal import terminals. They stand to profit from the free importation of coal for they have considerable coal mining investments throughout the world.

Like the giant US oil companies - EXXON and Occidental, Shell and BP adopted aggressive investment strategies designed to raise their shares of world coal mining and the global seaborne coal trade after the OPEC oil price rises of 1973/4. Shell has shareholdings not exceeding 50 per cent in many mining groups in North America and

Australia (see Table 8:2). Shell's operating companies in the USA and Canada have wholly owned subsidiaries operating coal mines and most of Shell's coal related activities are oriented towards the seaborne trade. Shell is clearly a corporation that has the capital resources and commercial interest to invest in the UK coal market. The corporation has already made its first moves to take advantage of the privatisation of the ESI by announcing its intention to build a 450 MW plant at Shellhaven refinery on the Thames estuary, which would burn imported coal.

BP Coal covers everything from prospecting to marketing and produces over 31mt (1987/8), or around a third of British Coal's annual output. BP has already indicated that it expects coal imports to rise to ten or 15 million tonnes by the mid-1990s. This would benefit the corporation's coal exporting interests in the United States, South Africa, and in New South Wales, Australia (Table 8:2). BP is also actively exploring for coal reserves in developing countries. An example of BP's activities is an Indonesian joint venture between BP and Perum Tambang Batubara, the state owned coal mining enterprise, which was signed in 1982, to explore and develop two areas in East Kalimantan covering 8,000 square kilometres (PetroMin, May 1987:20). Closer to home, BP Coal owns the lignite mining rights at Crumlin and at Coagh, on opposite shores of Lough Neagh in Northern Ireland (FT 04-11-86:8).

Following Cecil Parkinson, the Energy Secretary's state-managed announcement of "the ultimate privatisation" of the British coal industry at the 1988 Conservative Party Conference, a number of large corporations have expressed interest in investing in parts of the coal

industry. One of them is BP. Basil Butler, one of six BP managing directors stated in a lecture he gave in Glasgow:

'It's early days yet. But there may well be parts of British Coal that will prove very attractive to us' (quoted in the Glasgow Herald, 15-10-88).

He added that BP, as a major coal company in various parts of the world, had always felt frustrated that it could not invest in the industry in Britain.

Undoubtedly BP has the resources to invest in a privatised coal industry, but it is necessary to stress that BP's actions will be guided more by its global investments and the profitability of its other energy holdings than by its desire to control segments of the British coal industry. If any large energy group gains control of parts of the British deep mining industry there would always be the danger of colliery closures, not because of the profitability of collieries themselves, but due to changing conditions in the energy group's other industrial operations in the UK and overseas. The drive for short-term commercial advantage would militate against long-term commitments to coal production, particularly given the large capital costs involved in deep mining. Of course, BP and other MNCs could use profits from other fuels to subsidize long-term mining investments, but the fact is that BP Coal is likely to be attracted only to the most profitable safer pits and to opencast reserves which can be exploited at maximum profitability.



BP's diverse fuel investments mean that it is able to take advantage of the proposed privatisation of the ESI in other ways than importing coal. For example, BP has struck a deal with the North of Scotland Hydro Electric Board (NSHEB) to sell its gas from the Miller field in the North Sea, which will soon be developed. The output of the field would go to Peterhead power station in the north east of Scotland. Malcolm Rifkind, Secretary of State for Scotland, has welcomed the deal as a means of producing cheap fuel for the NSHEB, and also because the deal by-passes British Gas, which was recently criticized for its monopoly role in the gas industry (MMC, 1988). Nevertheless, the gas deal strengthens the hand of the South of Scotland Electricity Board (SSEB) in its efforts to force British Coal to cut its prices for supplies to local power stations, and it may contribute to the demise of deep mining in Scotland.

BP's case raises certain contradictions and ambiguities in the government's supposed free market philosophy and its attitude towards foreign investors. The government decided to go ahead with the sale of its remaining 31.5 per cent holding in BP in the wake of a collapse in the world's stock markets. This made BP vulnerable to a big share takeover by a determined purchaser. In the event the Kuwait Investment Office (KIO) secured a 21.6 per cent stake in BP despite discreet efforts by British officials to prevent such a large shareholding. In August 1988 the Monopolies and Mergers Commission was called upon to investigate the KIO holding, and it later recommended that the Kuwaitis divest their shareholding to not more than 9.9 per cent over the course of one year.

What is significant about this particular case is the way in which the government and the MMC identify BP's corporate interests with those of the UK. It was argued that such a large shareholding by an outside sovereign power in BP "would be detrimental to the United Kingdom's public interest." The facts are as Seymour observed:

'BP is portrayed as a national flagship in the oil industry which should not be tainted by foreign influence. This holds no water at all. For many years BP has been working hard to distance itself from national identification with the UK and has been remarkably successful in assuming a multinational character' (FT 01-09-88:15).

Indeed the government has opened up Britain's North Sea oil industry and former public corporations to greater foreign ownership by selling off its BP shareholding, and by the dismantling of the state-owned British National Oil Corporation (BNOC) in 1985. In turn, the government was unable to prevent BP using its financial and political power to bid for a large share of Britoil, the privatised assets of the BNOC.

Furthermore, the government has not opposed the recent acquisitions of a large proportion of shares in Enterprise Oil by Elf-Aquitaine of France. Enterprise was formed as a result of the forced divestment of British Gas oil assets before British Gas was privatised. Elf Aquitaine has purchased London and Scottish Marine Oil's (Lasmo) 25.5 per cent stake in Enterprise, which puts it in a strong position to make a full bid for Enterprise. So like BP (and Britoil) before it, Enterprise has effectively been partially re-nationalised by a foreign power.

Similar results may occur in both the electricity supply and the coal industry. The fact that MNCs such as BP and RTZ may become involved does not preclude UK energy assets from being controlled by big foreign investors. Multinational concerns are not owned by investment groupings acting together simply to promote singular corporate interests. Undoubtedly, all shareholders are interested in making profits, but the shareholders themselves may be part of other corporate, institutional and occasionally represent powerful sovereign interests. Thus, it is misleading to regard privatisation as a means of giving "power to the people" via share ownership. Small individual investors will have little say in what happens to privatised companies. It is also misleading to regard privatisation as a means of transferring public assets into the private sector. Eventual ownership may fall to both private and foreign owned state companies.

Future energy privatisations may also create new diversification options for British Gas, which could become a broadly based energy enterprise involving oil, gas and coal - and possibly power generation. Brokers at Kleinwort Grieveson have already hinted that British Gas would make an ideal company to take over British Coal. If such an event is allowed to arise, which is unlikely for political reasons, it would create the bizarre situation of a privatised double monopoly. British Gas have already held discussions with several private consortia wanting to generate electricity from gas. The corporation argues that such schemes could add around five billion therms a year to the UK's gas demand or about 25 per cent of total gas consumption. In the USA, combined gas cycle turbines are widely used to generate electricity. According to the American Gas Association construction lead times are a third less for small gas-fired stations than for

conventional coal plants, and their environmental impact is fractional (FT, 03-11-88: 'Energy Efficiency 7'). Thus gas could eventually become a major competitor to coal in the power supply market (3).

The last group of potential investors in the ESI and coal industries are the big mining and minerals groups. One of the main contenders is Costain, which also has investments in the engineering industries. Costain is one member of a consortium including Foster Wheeler and NEI, named the Loughside Power Company, which plans to build, own and operate private power stations in Northern Ireland. Costain is part of another consortium which is considering importing Soviet gas to generate electricity in southern England at the proposed new power station at Richborough in Kent. The company owns mining operations in the USA and Australia, and it has been a contractor on BC opencast sites. In 1985/6, Costain was responsible for some 16 million tonnes of coal per year from its global investments. Trafalgar House owns around eight per cent of Costain, and it is also involved in private consortia bidding for new power plant developments. Like BP and Shell Costain's investments in the energy sector are spread across oil, gas and coal.

RTZ is one of the largest minerals corporations in the world due in part to its big involvements in the global uranium industry, including mines in Namibia, southern Africa. Although RTZ has shed its oil and gas interests in the North Sea and its shares in LASMO and Enterprise Oil (see above), it has interests in the coal industry. In the past RTZ held a 12.5 per cent holding in British Mining Consultants Limited, an overseas mining consultancy with close connections with British Coal. The corporation is a substantial coal miner in Australia

via its 49 per cent share of CRA mining company, and it has the resources to invest in the UK mining sector and world coal trade. Early in January 1989, RTZ bought BP's Minerals for £2.4 billion, which represents the biggest ever private deal between two UK companies. The size of the deal indicates the commercial strength of both corporations. RTZ is currently in control of a wide range of mining activities and there can be little doubt that it is able to extend its mining interests in the UK if the government's privatisation plans go ahead.

What about the coalfields?

Privatisation creates investment opportunities in Britain for the MNCs with energy or mining involvements. The problem is that by exposing British Coal to the vagaries of the world steam coal trade and spot prices there will be nothing to prevent another round of pit closures on the basis of short term conditions. Coal market liberalisation and the opening up of opportunities for investment by multinational capital will not encourage any long-term commitment to the development of Britain's primary non-renewable resource. The fact is that market pressures will probably destroy British Coal's prospects of reaping the productivity rewards for its massive capital investments since the 1974 Plan for Coal (see concluding chapter).

Increased multinational capital investment in the electricity supply and coal industries may increase the marginalisation of some of the coalfield communities in the British and international economies. Pits in the so-called peripheral coalfields of Scotland, North East England, the North West and South Wales are extremely vulnerable to

closure. The local economies in coalfield areas are also likely to suffer from a run-down in activities and investment in businesses and services related to mining activity. Although nationalisation has proved to be destructive of mining communities, privatisation will tend to accelerate the process of decline in deep mining. Only the "super pits" and opencast mines are likely to survive. As David Guy, NUM Durham Area President has observed:

'Taxpayers money "loaned" to British Coal has helped develop the massive new mines which will be the meat of the corporation's privatisation sandwich.

The Selby complex, for instance, is one of the most technologically advanced mines in the world - developed by state subsidy in the interests of private capital' (quoted in The Morning Star, 06-09-88).

The "ultimate privatisation" of the coal industry, as Parkinson has termed it, is by no means certain. But there can be no doubting the government's intentions nor the direction of government policies. This is why it is very important to examine the powerful commercial stakes and the companies most likely to gain from current policies. Nevertheless, it is necessary to stress that there is nothing axiomatic in the position that privatisation means no national energy policies or priorities for the future, and no state interference or regulation to see that those long-term goals are met, regardless of short-term market fluctuations. The government's preference for a strong nuclear industry would have to be paid for by taxpayers and electricity consumers, and yet this would have little to do with market forces. The following chapter outlines reasons why there is a need for state intervention and long term planning to protect the coal industry, whilst helping to create a "cleaner", more sustainable energy future.

FOOTNOTES AND REFERENCES

(1) Privatisation will split the CEEB into two large generating companies. One is to be called National Power and it will retain over 70 per cent of current generating capacity in England and Wales, including 9,000 megawatts of nuclear capacity and about 30,900 MW of conventional fossil fuel capacity. The smaller generating company called Power Gen will control some 18,800 MW of conventional non-nuclear plant. A separate company called "Gridco", or the National Grid Company, will run the transmission system. Robinson and Sykes, two advocates of privatisation, have argued that the division into two big companies will not reduce monopoly. They suggest that private companies will perceive very high risks in bidding against privatised companies with a high proportion of their costs sunk and with considerable ability to cross-subsidize.

(2) Gavin Laird, general Secretary of the Amalgamated Engineers rejected the takeover on the grounds that

'Consolidated is a South-African-based company with little real experience of the engineering industry out of a record of taking over companies and stripping them' (quoted in FT, 23-03-83:8).

Charter has had stronger links with the apartheid system than Anderson, although it has recently loosened its ties. In 1966, Charter had a 38 per cent (by asset value) stake in South African Investments, which it sold to Anglo American

and its associate, De Beers Consolidated Mines Limited in 1979. Charter still holds a 33.5 per cent stake in Anglo American Corporation of Zimbabwe, and a 3.8 per cent holding in the Minerals and Resources Corporation (Minorco), the same company that is bidding for Gold Fields. Anderson Strathclyde has a small engineering and servicing subsidiary in South Africa.

- (3) Wharton Econometric Forecasting Associates, a consultancy for the oil industry, has predicted big increases in the use of natural gas. By the year 2010, natural gas may be generating 16 per cent of Europe's electricity compared with five per cent in 1988.

TABLE 8:1

Charter Consolidated: vital statistics regarding mining related activities

Main Operations including coal and mining related activities	(all 1987 in £ million)		
	Turnover	Operating profit/ (loss)	Capital employed
<u>1. Manufacturing</u>			
<u>MINING EQUIPMENT</u>			
Anderson Strathclyde*	102.2	9.7	45.6
National Mine Service (NMS)	37.6	0.1	13.0
Perard Torque Tension	7.8	(0.6)	3.4
Total	147.6	9.2	62.0
<u>OTHER EQUIPMENT</u>			
Building Products (Cape)	60.1	7.4	23.4
Rail track equipment (Pandrol)	37.4	5.7	13.4
Licenced trade equipment (MKR)	14.6	1.0	7.6
Manufacturing Total	259.7	23.3	106.4
<u>2. Construction</u>			
Industrial contracting (Cape)	68.7	0.5	11.2
Civil engineering & construction (Shand)	99.6	(0.4)	5.5
Construction Total	168.3	0.1	16.7
<u>3. Mining</u>			
Coal (Shand Mining Incorporated)	34.3	2.2	24.3
Wolfram (Beralto)	4.9	(1.9)	10.5
Metal Marketing	0.4	-	(0.2)
Mining Total	39.6	0.3	34.6

Notes: The Charter Group had a total turnover from operating subsidiaries of £505 million in 1987. The other main activity not included above is investment finance. During 1986/87 Charter sold some of its coal mining related businesses, including MNS's mining machinery division in the USA (part of the Anderson Strathclyde group). It also sold UK opencast coal mining contracting business belonging formerly to Alexander Shand (Holdings) Limited. In 1985, UK opencasting made a profit of £0.5 million for Charter from an annual turnover of £31.8 million. Shand operated four sites, three in S. Wales and one in Leicestershire, which produced 1.9 m.t.

* Anderson Strathclyde has eight plants employing approximately 3,000 people (early '87). In 1982 Anderson Strathclyde employed 3,385 people in five Scottish plants, and 490 people in three English plants. Overseas, Anderson has sales and distribution outlets in many countries. Its manufacturing subsidiaries are Anderson Mavor in Transvaal, South Africa; A.B. Rea & Co. in NSW, Australia. It has a number of repair and after sales service outlets, including National Mine Service in USA. The other Charter coal machinery interest is Perard Torque, maker of rock drilling equipment, and is a major supplier of roof bolts to BC. Shand Mining Inc. runs mines in the USA.

Sources: MMC, 1982; Charter ARs, 1985, 1987; Anderson Strathclyde PR.

TABLE 8.2

Shell and BP's interests in the Australian Coal industry1. BP Coal Australia (wholly owned by BP Australia Ltd.)

Mine	District	Raw coal production 1986-87 (tonnes)	Employment June 1987
Tahmoor	South, NSW	1,390,000	367
Western Main	Western, NSW	600,400	53
Western Main open cut	Western, NSW	92,100	6
Hazledene	Singleton-North West, NSW	664,400	148
Howick open cut	" " "	2,970,900	397
Newdell Washery	" " "	-	86
		5,717,800	1,057

2. Austen & Butta Ltd (Owned by The Shell Co. of Australia Ltd. 45% ; AMP Society 17%, various others 38%)

South Bulli	South, NSW	1,686,000	629
Yellow Rock (now closed)	" "	295,200	17
Avon (now closed)	" "	792,300	37
Grose Valley (now closed)	Western, NSW	455,200	16
Invincible	" "	775,600	265
		4,004,300	964

Note : The Shell Company of Australia also have a 39 per cent stake in Drayton Joint Venture which produced some 2.9 million tonnes of raw coal (Steaming) in 1986-7.

Source: The Australian Coal Association

CONCLUSION

LINKS IN THE CHAIN

'It might be said that energy is for the mechanical world what consciousness is for the human world. If energy fails, everything fails' (Schumacher, 1974:101).

'It is unquestionably in the public interest to have the cheapest possible fuel. But what is the period of time which we ought to be considering? A year, a decade, a generation, or a century? This is the crux of the matter' (Schumacher, 1960:10).

If one accepts the centrality of energy to our continued existence on planet Earth, then it is all the more perplexing that successive British governments have failed to realize the enormous potential benefits of having a national energy policy based on indigenous non-renewable resources and, the development of technologies to utilize renewable energy sources for future generations. This study, in common with many other examining different aspects of the British coal industry, has highlighted the need for positive policies towards the deep coal mining industry within the framework of long-term national energy planning.

The simple fact of the matter is that deep mining is threatened by the "short termism" engendered by the government's adherence to a market forces philosophy and by the process of privatisation itself. If pits continue to be closed on the basis of short term productivity and cost criteria there will be very few collieries in operation by the mid-1990s. If collieries close, a variety of income and multiplier effects will result in the closure of businesses within coalfield

communities and in the wider mining supply industries. To stop the decay in the coal mining infrastructure it is vital to develop positive measures to protect deep mining. Section 9.1 highlights how an understanding of engineering linkages with the coal chain should form part of a longer term and more positive attitude towards the British mining industry.

The subsequent section 9.2 examines the immediate prospects (ie up to the mid-1990s) of the deep mining industry in the light of current government and British Coal policies. It develops the case for developing long-term strategies towards energy industries, particularly towards the mining and use of Britain's primary non-renewable energy resource - coal. This leads on to an analysis of the connections between the type, size and locations of power plants and the survival of existing deep mines and mining communities. Section 9.3 examines these links, and how the privatisation of the electricity supply industry (ESI) may have an impact upon the geography of power plants and energy supplies. In turn, there will be significant costs and benefits for local economies dependent on one energy form or another. The central argument of this section is that state regulation and planning should ensure that the benefits are maximised for consumers, local economies, producers (ie workers), and not simply for capital. Even within a wholly privatised energy sector, the state can do much to influence the geography of production, energy and electricity supplies.

Hitherto, the thesis has devoted little space to the links between energy industries and environment pollution. The burning of fossil fuels is one of the most polluting activities in the 20th century. Policies designed to reduce pollution levels from coal-fired

electricity generation plants should form a crucial part of developing a positive case for deep mining. The opening section of this thesis argues against the current British Coal strategy of raising productivity and output levels from fewer and fewer pits and faces. Better use of modern mining machinery can help to maintain production and conserve reserves at existing pits. In the meantime the government and local authorities could introduce a package of measures to reduce energy consumption in the long-run. Coal imports, opencasting and rapid pit closures are neither an answer to the long-term problems of environmental pollution nor to the socio-economic problems faced by coalfield communities.

Section 9.4 examines some of the conflicts between privatisation and short term commercial interests and longer term goals, particularly the need for a clean, healthy environment. Although the section does not examine other energy industries in depth it does examine the crucial issue of pollution caused by coal-burning. The argument advanced here is that investment in "clean coal" technologies within the framework of sensible depletion policies for non-renewables and greater investment in renewable technologies, would help to create a secure and reliable energy base for Britain in the 21st century. An expansion of the civil nuclear programme by building new Pressurized Water Reactors (PWRs) would displace some coal from the power market and so indirectly cut fossil fuel pollution. But the nuclear industry can not solve its own waste problems, and new nuclear power stations will only help to accumulate the threat of radioactive pollution in various forms. Pollution abatement costs are critical in the energy decision-making process.

It is also necessary to analyse links between energy, the environment, and jobs. The privatisation of the electricity supply industry is likely to have a big impact on employment. Section 9.5 examines the need to protect jobs, which is a central concern of the labour movement, and has caused rifts between and within unions over appropriate energy policies. Inter- and intra-union divisions can be traced to union membership in different fuel supply and parts of energy industries. Positive arguments for deep mining must take account of the possible adverse consequences for jobs in other industries. It is argued that a non-nuclear or phasing-out strategy would have more beneficial employment effects in the economy than an expansion of nuclear capacity. This leads on to the final section which discusses ideas for energizing local economies by choosing appropriate energy policies.

Underlying most of the arguments in this concluding chapter is the belief that many of the contradictions between the short term interests of capital and longer-term needs of society for jobs, secure energy supplies and a clean environment can be resolved by sensible state planning. Above all else there is a need for long-term energy priorities covering the whole energy sector. Nevertheless, the current government has often proclaimed that it does not have a UK energy policy. Yet by accident or by design numerous state policies are fundamentally changing the structure of ownership and control of the UK's energy resources (see chapter eight). Events in the energy sector are being heavily influenced by other policy goals, which are partially ideologically motivated, including the privatisation of the ESI, partial privatisation of coal, and the liberalisation of the UK coal market. As such the government is not devoting much time or thought to

the formulation of UK energy plans, targets or production quotas for individual fuel industries. The "energy policy" is, if it can be called one, that the government will do its best to protect a market share for nuclear power, but leave most energy matters to competing sectional interests in a "privatised", if not wholly "private" sector. Cecil Parkinson, the Secretary of State for Energy, has tried to equate the government's privatisations in the energy sector with an energy policy. This was in a speech delivered at the 1988 Annual Conference of the Institution of Mining Engineers:

'Put simply, our energy policy is this: we want customers to be free to choose the energy they want, knowing that there are private thriving industries able to provide it on competitive terms. We believe that those industries generally work most efficiently if they are in the private sector' (The Mining Engineer, September 1988:148).

Some of the flaws in this uncritical view of market forces were highlighted in chapter eight. There is a danger that competing sectional interests and the government's interest in getting a "good price" for selling off national assets to private capital and foreign investors will largely determine the shape, structure and goals of Britain's energy industries in the next decade or so. The result may be further deep cuts in deep mining capacity, rapid exploitation of North Sea oil and gas reserves, and an increase in fuel imports. With the exception of nuclear power and possibly renewables, fuel industries are subject to the vagaries of international market prices like other "commodities". Short-term price fluctuations and the commercial interests of corporations may conflict with longer term needs, such as energy security and pollution reduction. It is unfortunate that the government's political preference for privatisation with minimal state

interference may mean that Britain loses much of its energy independence (see chapter eight).

9.1 Coal conservation, coalfield communities and engineering linkages

State ownership did not herald in a different approach to technical change in industry. Initially the NCB was able to take a long term view of its capital expenditures without fear of major cut backs, because coal was virtually a monopoly fuel on the market. King Coal's market domination ended in the era of cheap Middle East oil. It was during that period that technology was used as a means to increase the competitiveness of coal by raising output per manship (OMS), and by reducing wage labour costs. The development of mechanised mining meant that for each level of output fewer pits and fewer miners were needed (see chapter five).

The NCB adopted a unilinear technological approach based mainly on the mechanised longwall mining system. No attempt was made to decentralise the technical change process in order to encourage the development of appropriate technologies for particular coalfields, or even for specific pits. If there were innovations to machines to meet the needs of local collieries these were usually carried out at local workshops or at the mines themselves. There was no serious effort to formalise a system of research and development that had as one of its primary objectives the need to conserve valuable coal reserves and to maximise coal "out take" over the life-time of collieries, as opposed to coal "output" over short-term horizons (i.e. less than five years).

The brief which mining engineers worked to was to increase productivity indices, especially labour productivity, as rapidly as possible. Furthermore, the major innovations and general direction of technical change in the industry were orchestrated from Hobart House and the Coal Board's central engineering research establishment at Bretby. Underground trials of new innovations took place at selected pits in the Midlands. In the 'sixties the NCB's capital investment became more selective. Pits were chosen for new investment because they met the technological requirements rather than the technology designed to meet the needs of pits. This strategy favoured the central coalfields and contributed to a geographical concentration of productive capacity.

The 'seventies brought a new era of expansion for the NCB, especially after the OPEC oil price rises. The Coal Board decided to begin work on the new Selby "super pit" complex which would further intensify output in the central coalfields. Microelectronics also helped the NCB develop a particular concept of advanced technology mining based on closed looped systems and microprocessor controls designed to maximise surface managerial control of the mining labour process. These developments facilitated workforce reductions at existing pits, colliery mergers and more closures. In turn, more coal reserves have been effectively sterilized, more people consigned to unemployment, which has added to the social dislocation and marginalisation of many coalfield communities.

Nationalisation has certainly failed to protect the interests of the vast majority of workers in the mining industry, and in many ways, it has proved to be more destructive of local economies than any single private enterprise could ever be. But the changes wrought by the Coal

Board should not be viewed in isolation from the considerable political, financial and economic pressures acting upon it. Coal nationalisation's failings are largely the result of the failure of successive governments to clearly define and act upon social objectives, such as the need to maintain mining activity in areas where it is the dominant source of livelihoods, at least until suitable alternative sources of employment can be found or created. The ability of the Coal Board to plan ahead and to manage the nation's coal reserves was also restricted by tight pricing, financial and external market constraints, all of which were controlled or influenced by the state. Similarly, the lack of some element of long term coordination between the main investment and production priorities of the NCB (British Coal) and the major coal-using, state-owned industries, has been one of the most damaging weaknesses of nationalisation for mining communities.

Privatisation of the industry would increase competition and provide commercial incentives for management, but it would not tackle the issue of conservation or the long term problems of economic development in the coalfields. In fact, the injection of the profit motive into the industry is likely to lead to further capacity cuts in deep mining and pressures to raise opencast output (see chapter seven). What is really needed is for politicians, civil servants, and British Coal personnel to introduce some form of social cost accounting into their decision-making (1). Under present circumstances such a notion is as much a "fairy tale" as Prior and McCloskey's "idealist scenario" of full protection from coal imports. And given the market forces rhetoric of BC's directors it is difficult to disagree with Robinson and Sykes (1987:49) view that

'Redundancies there will be whether British Coal continues in its present shape or whether private sector firms succeed it, since costs cannot otherwise be reduced to competitive levels.'

In spite of the dominance of short-term commercial perspectives there is clearly a need to develop alternatives if one is concerned about the socio-economic well-being of coalfield communities and the long term energy future (ie beyond 2000). Other sections outline how positive policies towards coal are compatible with reducing the consumption of fossil fuels, cutting pollution levels and diversifying Britain's energy base. The rest of this section examines reasons why an understanding of the complex inter-industry linkages between the public sector and private sector equipment suppliers should form part of any strategy designed to achieve such long-term goals.

It should be recognized by policy-makers that successful long-term management of the UK's coal resources and sensible production planning would have benefits in the manufacturing sector in terms of technological innovation, training, skills development and employment stability. Some 60,000 engineering jobs could be adversely affected by another big decline in deep mining capacity (see chapter six). Policies aimed at concentrating capacity on a few "super pits", opencast sites, and higher import levels, will do much to shorten the life of deep and shallow workable reserves. Such policies will also substantially reduce the home base for mining equipment manufacturers in the 1990s.

Hitherto, BC's technological strategy has benefitted most manufacturers, but the capital goods they have supplied, such as more and more powerful heavy-duty machines, has helped in the overall rationalisation process. Without government measures to raise domestic

coal demand in the power, industrial and commercial markets for British as opposed to imported coal, there will be an inevitable decline in demand for new and replacement machinery in the next five years. Some of the larger suppliers may hold on to their market shares, but absolute levels of demand will be lower. This may persuade the manufacturers to reduce sub-contracting in order to maintain their own "core" of skilled employees. Thus, some secondary suppliers may be squeezed out of the mining business altogether (see chapter six).

Many of the companies affected by the restructuring of British Coal are likely to either reduce the level of mining business or withdraw into more profitable sectors. For small companies with limited capital resources and high levels of dependency on British Coal the commercial future is bleak. Larger groups with diverse industrial holdings are likely to disinvest in mining related activities and to sell their existing mining subsidiaries or entire divisions. There is already evidence of this. Dowty, one of the biggest names in the mining machinery industry, is considering the sale of its mining division to a management team backed by Bankers Trust. The Dowty group is consolidating its activities in defence, electronics and information technology. Since the 1984/5 miners' strike Dowty's mining equipment interests have become the least profitable of the group's total business portfolio. Dowty's mining profits fell from £4.8m to £1.9m in 1987/8, and they have consistently been lower than other Dowty divisions over a three year period. With British Coal cutting back its productive capacity to an ever smaller number of working collieries and coalfaces there is going to be a much reduced home demand for new and replacement face equipment in the 1990s. Dowty's corporate bosses realize this and they also realize that exports cannot make up for the loss of home demand.

Another major mining machinery supplier in trouble is Anderson Strathclyde. The company is one of the main suppliers of coal cutting technology for longwall faces in the world, but the prospect of a reduction by at least a third in British Coal's deep mine faces by 1992 has prompted a corporate decision to rationalise. In the year to September 1988 Anderson Strathclyde made a loss of £3.25 million. Faced with falling home orders the company closed its Kirkintilloch plant near Glasgow and sold another plant at Glenrothes in Fife. Anderson's parent company, Charter Consolidated is well-known for its asset-stripping ventures and it is unlikely to be sympathetic to the arguments of Anderson's workforce unions or local authorities, all of whom stress the importance of the company to engineering industry in Scotland and as a source of around 2,000 jobs (see Chapter six). Charter's corporate bosses will be concerned with profits rather than broader socio-economic arguments. They will base their strategy on statistics like the fact that Anderson's return on capital invested has been less than one per cent compared with a group target of 20 per cent. Without a big increase in orders from British Coal there will be further redundancies and possibly even the closure of Anderson's main plant at Motherwell, which in the early 1980s had a major capital expenditure programme with the introduction of flexible manufacturing systems (FMS) into one of its workshops. Like Dowty, Charter Consolidated may soon decide to sell its mining equipment interests altogether.

The fact that two of British Coal's preferred suppliers are withdrawing or cutting capacity in their mining machinery businesses does not auger well for the whole industry. In the North East of England, companies such as Huwoods and EIMCO are desperately trying to

expand their export base as well as to diversify into markets other than deep coal mining. The task is a difficult one, particularly for specialist engineering companies producing specific capital goods mostly to British Coal standards and specifications. If the prospects are poor for primary suppliers they are worse still for the companies that feed off the business of those primary companies. Anderson Strathclyde and Dowty Mining Equipment have been important as direct employers and for the sub-contract work they generate. In the late 1980s sub-contracting is drying up.

The decline of what has been a significant, if small, segment of British engineering activity is a big cost of the rundown of deep mining in Britain. In 1986, Belch of NEDO's Economic Development Committee looking at the mining machinery industry was under-stating the case when he noted

'There could be a danger that pressure on the NCB (BC) for short-term results may inhibit the necessary long-term investment' (memo. 61 to the House of Commons' Energy Committee).

The fact is that the pit closures of the 'eighties have created severe over-capacity in the UK mining machinery industry, particularly among those suppliers making underground machinery. Once several suppliers withdraw from, close down or move out of producing mining machinery, British Coal may be forced to purchase equipment from overseas as it had to after 1947 when the UK industry was too small to satisfy the NCB's demands.

To some extent the mining machinery makers have contributed to their own demise. Productive over-capacity in the supply industry has

been generated partly by the technology they have supplied. Undoubtedly the development of the mechanized longwall system and advanced monitoring and control equipment for underground mines has provided British manufacturers with a technological niche in world mining markets. Simultaneously, they have supplied British Coal with the technical means to create "underground coal factories" like the Selby complex. But the technology has been designed and implemented in a highly selective way. Many pits and large parts of whole coalfields received very little investment in new machinery, which ultimately contributed to their demise.

British Coal scientists and technologists and the machinery makers have accumulated vast experience in developing mechanised and automated mining systems. Researchers at Bretby are exploring ways of applying Artificial Intelligence for data monitoring and control systems already deployed in British mines (Tregelles, 1986). And the days when it will be possible to have virtually unmanned underground coal production under good machine operating conditions are probably very close. Humans will no longer have to go into the bowels of the earth to dig for coal. Nevertheless there is an urgent need to question the whole direction of technical change in the British mining industry. A major conclusion of this research is that external constraints upon and the narrowly defined objectives of BC's senior decision-makers has resulted in a highly sophisticated but self-limiting perception of modern mining. This conclusion is not based on engineering knowledge, but on research of the major consequences of the application of engineering knowledge in the mining industry.

A more regionally balanced investment strategy by British Coal could have utilized the technological expertise available to it within the organisation and in the private sector to keep numerous pits in productive use that are now shut due to "economic" reasons. Manufacturers have had to design and make equipment to specifications and demands set by British Coal. Over the years BC has 'fine tuned' the system of longwalling and greatly reduced the types of machines at work in British mines. Capital goods designed for unfaulted and relatively good geological conditions have been chosen because they will raise productivity. This strategy has succeeded under the narrow terms set by the Coal Board bosses, but it has also been wasteful of human and non-renewable resources. Much technology that could have been applied in the "peripheral" coalfields in the UK has gone to other countries. Mining machines have been designed for very thin and faulted seams, steep inclines and for a great variety of geological conditions, but the Coal Board has not encouraged their use in the UK, except for a few isolated cases.

It is not too late to design, develop and to implement mining technology in ways that are more human-centred and socially responsible (ie less destructive of jobs and communities). This would require a reversal of current attitudes and radical changes to the politics of production (see chapter five). Policy shifts are unlikely under the current political climate. Alternative approaches are brushed aside because they would need considerable state support. John Northard, BC's Deputy Chairman, exemplifies the new management attitudes fostered by Thatcherism. He argues that all the pit closures in the 'eighties were necessary as the only way of revitalising the business and making

it fully competitive with other energy sources (BC Press Release, 08-12-88). He has dismissed the arguments of people who oppose wholesale pit closures by arguing that they would turn "the industry virtually into a social service".

What is wrong with an alternative strategy that seeks to reduce people's dependence on the state by keeping local economies productive and communities intact? What is wrong with a more imaginative approach to capital investment that actually maintains mining jobs and could generate more work in the manufacturing sector, and possibly create new export opportunities? What is wrong with production strategies that aim to maximise coal out take over a long period with minimum exploitation of untouched reserves, so that coal can remain a fuel option for future generations of people well into the 21st century and beyond?

These questions are raised because a determined effort is needed to prevent still further job losses, and the enormous social and indirect costs arising from industrial decay and unemployment. The aim is not to create a "social service" out of British Coal, but to prevent further strains on existing social services in areas where there are few job alternatives to mining and jobs dependent upon mining. It is to highlight the fact that the current preparations for the privatisation of the ESI (and of the coal industry) will have detrimental "knock on" effects on mining suppliers in the private sector. Indeed, sections of private capital are likely to go out of business.

Unfortunately the immediate prospects for the coal industry are grim due to the government's willingness to keep the UK market open to

coal imports, and due to the purchasing strategies of the electricity boards in preparation for their own privatisation. This makes it important to assess the scale and depth of the problems the nationalised coal industry faces up to the mid-1990s.

9.2 The short-term future of deep-mining in the UK

Two very useful studies have already outlined many of the consequences which the privatisation of the power supply industry is likely to have on the British coal industry by 1990, 1992 and 1995. Table 9:1 is a summary of the most probable future scenarios highlighted by these studies (see Prior and McCloskey, 1988; and Dewhurst and Gladstone, 1988). Both studies indicate further rapid reductions in colliery capacity, with the lowest forecast being only 24 collieries surviving in 1990.

The major short term threat to the survival of many collieries comes from plans to increase fuel imports. To some extent the actual number of pit closures will depend upon the capacity of the British port handling infrastructure to take in large tonnages of foreign coal. Without some form of protection from imports feeding the power station market numerous collieries with years of working life left in them could close down prematurely.

Nevertheless, the government is adamant that it will not protect monopolies and that putting up trade barriers against coal imports would run counter to its international treaty obligations. It denies

that imports will wreck the deep mining industry, but will help to make British Coal more competitive. As Parkinson put it:

'Refusing to forbid imports is not the same as urging an all-out import policy. It is defeatist nonsense to say that a commitment to free trade means a commitment to the promotion of imports. The worthwhile restrictions on imports are not artificially imposed barriers. Instead they are high levels of productivity, efficiency and competitiveness; this is how the British coal industry can really keep the imports out' (The Mining Engineer, Sept. 1988:147).

For reasons outlined later in this section, the government's arguments have several flaws. It is simply not feasible for British Coal to lower its costs to the level of spot prices on the ARA market in time to prevent imports from taking place. Imports will not displace opencast output but will remove some British produced deep coal from the power market. Dewhirst and Gladstone (1988:43) estimated that a maximum importation of 27.6 million tonnes per year by 1992 could lead directly to the closure of 36 collieries employing 41,300 people, plus the loss of 10,200 other mining jobs. Additional pressures on BC from the government and electricity suppliers to reduce production and sales costs in preparation for the privatisation of the ESI; BC's arbitrary 1988/9 deadline for financial break-even; and the introduction of six-day flexible working practices and more competition from opencasting and private mining groups, may combine to have even more devastating effects on the deep mining industry.

'Between 62 and 72 collieries would shut and between 69,000 and 81,500 jobs would disappear. Clearly no coalfield can hope to avoid being heavily hit. Mining would retreat into the rump of Yorkshire and Nottinghamshire "big hitters" supported by a handful of scattered pits in other areas' (Dewhirst and Gladstone, 1988:43).

The issue of "flexible working" is significant (see chapter five for details). British Coal could increase output from a smaller number of pits by introducing six day working, presently resisted by the NUM. This could raise output by as much as 50 per cent and reduce fixed costs per unit of production. According to one economist, Pryke, writing in the Financial Times (19-10-88:25). by reducing unit costs and boosting output BC would be able to provide 60 million tonnes of deep mined coal at an operating cost of no more than £1.07/Gigajoule in 1992/3. He goes on to argue that BC could be employing as few as 28 collieries in England and Wales with a total workforce of only 30,000 miners.

Two crucial questions come to mind when faced with such bleak scenarios. Firstly, who will pay the enormous direct and indirect, quantifiable and non-quantifiable costs of further colliery closures? Secondly, where will the people made redundant in the mining and mining related industries be employed. These questions have recurred time and time again since the first major spate of pit closures in the late 1950s. The overwhelming burden of closure, redundancies and social decay has fallen on the mining communities themselves, although the cost of social security and unemployment benefits has fallen on society as a whole. There has been a general unwillingness on the part of successive British governments and the Coal Board to include even a small fraction of the total social costs incurred by closures into their public accounting procedures.

British Coal is planning to cut its existing workforce of about 114,000 employees by a quarter over an 18-month period. This will mean the loss of another 20,000 jobs out of an 87,000 strong underground

workforce (FT 26-11-88:5). British Coal have argued that its restructuring programme to date, involving the loss of 107,000 mining jobs and the closure or merger of 79 collieries since the miners' strike of 1984/5, has confirmed the corporation's credibility as a supplier of choice to UK coal consumers (BC, 14-11-88). In so doing, it has behaved in much the same way as any private sector corporation in dealing with a financial squeeze. The only difference is that BC's major financial worries are largely the result of government measures imposed for a mixture of political, monetary and ideological motives (see chapters four and five). Although a half year interim report by BC has described results as "the best in over 20 years", in fact the financial balance sheet has worsened due to higher government interest charges, a freeze on coal prices, and cost inflation, which together could add £200 million in debt burden by the end of the 1988/9 financial year, which will turn sizeable operating profits into large losses. Government policies are also contributing to the "latest job shake out", as it is described by the financial press. Its proposals to encourage greater competition, including fuel import penetration, in the privatised electricity market, have caused the shrinking but ever-present "high cost tail" of British Coal to wag once more. Pits in Scotland, South Wales and the North East of England are particularly vulnerable to closure.

In preparation for more "economic" closures BC are preparing higher redundancy settlements. Kevan Hunt, the corporation's director of industrial relations, has stressed BC's determination to avoid compulsory redundancies. The higher redundancy payments are targeted at miners over the age of 34, the average age of the underground workforce. Almost all men older than 50 have left the industry in

earlier closures, and so most of the people made redundant in the closures to come will be in their late thirties or early forties. In other words, in the middle of their working lives. Given the lack of job opportunities outside the mining sector there is likely to be a large addition to the numbers of people without jobs in local economies, whether officially recognised as unemployed or not. Of course there is nothing new in this, and the system of voluntary redundancies has long been used by managements as a means to introduce capacity cuts without recourse to sacking workers. But the element of compulsion is still there, because the decisions to reduce the numbers employed have already been made. Furthermore, the lower average age of miners compared to earlier rounds of redundancy is going to pose big problems for the coalfield communities. In addition to the "middle aged" core of unemployed from the miners themselves, the loss of local pit incomes reduces opportunities in the local service sector, including many jobs for women. Without alternative sources of employment in the communities affected by closure there will be a lack of job openings for young school-leavers. But as Hudson and Sadler (1985:226) stress, there are deeper social costs involved.

'With the closure of collieries and disappearance of jobs, the material basis of the cultural and social life of the coal mining communities would be removed. It is not simply employment that is threatened but a way of life. The attempt to resist further closures and job losses must be understood not just as a protest against a future of life on the dole but as an expression of the value placed on this way of life by those who live, learn and work in such communities.'

The Coalfield Communities Campaign have outlined other considerations which make it imperative that the government introduces longer term and more positive policies towards Britain' declining deep

mining industry than it has so far been prepared to do. These "considerations" are outlined in Table 9:2. Added to these are the many linkages between coal mining and suppliers of capital goods and services to the mining industry. All these interlinkages and concerns means that it is impossible to draw a clear line between economic and social problems in the coalfields, and as the CCC (1986) stressed in their evidence to the Energy Committee, one of the best ways of tackling these interrelated problems in mining areas is "an energy policy which gives appropriate emphasis to the use of indigenous coal."

The need for longer term perspectives

Before discussing some of the longer term measures that could be implemented to produce a cleaner and more energy efficient coal industry it is necessary to face some of the most immediate threats to the industry. Firstly, the uncertainty generated by the proposed privatisation of the ESI has made it almost impossible for the British Coal Corporation to proceed with major long-term investment commitments and to plan ahead of the next end-of-year financial results with any confidence. In spite of this uncertainty, coal will remain a major fuel for power generation during the next decade. Nuclear power currently provides some ten per cent of UK generating capacity, less than 20 per cent of electricity supplied, and less than four per cent of the total UK energy provided to the consumer. Although the construction of Sizewell 'B' PWR is underway and the Hinkley 'C' PWR public inquiry is proceeding, the PWR programme is already behind schedule, and until the late 1990s the prospects for the nuclear displacement of coal-fired power plant capacity on any scale do not look good. All but one of the CEGB's Magnox stations are due for

shut-down during the 1990s due to the very high costs associated with extending their operative life-spans. There is also the possibility that AGR stations such as Hartlepool will close down due to the expense of refitting them to improved safety standards (New Scientist, 25-02-88:42). Whilst gas is becoming increasingly attractive as a fuel source for small power stations it is unlikely to displace much coal before 1995. Furthermore, the government is unlikely to announce sweeping incentives to increase research and development and investment in renewable technologies, and even if it did do so, renewables would not contribute much electricity to the national grid before the year 2000. Thus, sensible energy policies need to be based around the UK's major non-renewable resource - coal.

One of the most surprising comments for anybody who has studied the post-war history of the British coal industry was made by Pryke, an economist, who argued that the BC corporation is reluctant to introduce capacity through six-day production at a time when it is difficult to make room for Selby's rising output. He goes on to say:

'British Coal is once again pursuing the old National Coal Board policy of trying to preserve as many pits as possible' (FT, 19-10-88:25).

The fact is that since 1957 the Coal Board (British Coal) has deliberately sought to concentrate production capacity on fewer and increasingly productive faces. To argue that they have ever had anything resembling a pit preservation policy goes against the historical record of rapid pit closures, and as BC's chairman has put it, a scale of restructuring in the 1980s that is "unparalleled in recent British economic history".

Pryke's view of the industry is indicative of the kind of "short termism" engendered by current government policies affecting the whole energy sector. The logic is simple. More pit closures are necessary to improve short-term cost competitiveness against cheap coal on the international market. But as noted in chapter seven, there are a number of reasons why a longer term perspective is required for Britain's deep mining industry.

One set of arguments is based on an analysis of the international steam coal markets. Prior and McCloskey (1988) stress the financial trade offs to be made between allowing in unfettered imports and what they term as the "idealist scenario" of full protection for the domestic mining industry, which would cost approximately £130 million annually. Assuming BC adopt six-day working, Prior and McCloskey argue that the corporation should be a cheaper source of coal for UK power stations than imports by 1995. They also suggest that the power market for coal could grow to around 120 mt per annum before 2000 AD. In this case, unless the British government is prepared to subsidize the coal industry in the short-term, i.e. at least up to 1992, the industry will be unable to meet home demands. Britain will then be forced to import coal and pay the financial costs for doing so, estimated to be around £ten million per year and rising.

As Prior and McCloskey (1988:92) put it:

'The adoption of six-day working with minimal closures is, in principle, an attractive policy economically but, unfortunately the consequent output increases are far too large to be accommodated in the domestic market. A different government policy might encourage such a surplus and would be prepared to subsidise exports until

such time as the domestic industry was competitive. That however would be another story, one which for the next four years at least would be a fairy-tale.'

Imported coal is heavily subsidized and the prices charged on international spot markets are unreliable indicators of actual production costs (see chapter seven). Yet a fully liberalised coal market will enable importers to secure a sizeable share of the UK power market. In the short term, MNC coal traders will be able to undercut competitors' prices, including British Coal, in order to capture the newly privatised electricity market. Once they have a stranglehold of a section of the market they will be better placed to raise their prices and profits. Greater reliance on imports may prove to be financially beneficial to power generators and distributors in the short run, but in the longer term it may prove to be counter-productive, for it will increase the UK's dependence on imports at higher costs to those paid in 1988/9. By the mid-1990s BC's "high cost tail" will no longer exist. The only collieries left to close will be BC's prized high-tech "super pits". The option of raising coal output to replace imports will no longer be open if the super pits are working at full capacity.

Dewhurst and Gladstone (1988:36) highlight another case for protection of the coal industry during the period up to and following the ESI privatisation. As they point out:

'Coal-fired power stations represent 30-40 year investments and can not be subject to insecure supply. It is difficult enough to predict spot coal prices, but far harder to predict freight rates and impossible to predict foreign exchange rates over five to ten let alone 30-40 years. Partial

protection from adverse foreign exchange rate shifts can be gained on the futures market but it is unlikely that genuine insurance against adverse foreign exchange rate movements over the life of a long term coal contract could be developed.'

Another set of arguments favouring some form of protection for the coal industry is based on the need to conserve valuable reserves of the nation's primary non-renewable energy asset for future generations. The Coal Board have never been able to develop a sophisticated long-term coal reserve management strategy because successive governments have usually adopted short-term measures in response to changes in energy supply conditions and fluctuations in fuel prices. The environmental organisation, Friends of the Earth (FOE), have stressed the need for long-term thinking over energy matters. A four to five year time horizon, ie the average term of office for a government before it has to seek re-election, is inappropriate for major energy policy decisions. Large-scale power stations can continue to be operational for over 30 years. The environmental problems associated with fossil fuel burning are going to remain well into the 21st century and the damage already done by acid rain may take centuries to recover from. The management of nuclear wastes will require timescales of many thousands of years. FOE (1985) suggested that reasonable timescales for policy decisions should be the short-term (the next five to ten years), in the medium term (the next 25-40 years), and the long term (beyond 40 years).

As regards policy thinking towards the coal industry it is worth reiterating Schumacher's words of 28 years ago. Since 1960, Britain's coal base has rapidly diminished, as much by deliberate political and

economic choice as by natural exhaustion of collieries' workable reserves. So his words are more urgent than ever today.

'...we must recognise that the concepts of "economic" and "uneconomic" cannot be applied to the extraction of non-renewable resources without very great caution.

... To eliminate the losing factory means the elimination of waste. But to close the losing colliery means merely to change the time sequence in which finite resources are being used... the latter may mean the elimination of a valuable asset although it is known that this asset cannot be replaced and will in all probability be badly needed by the next generation.

... In the coal industry, we are in any case forced to think in terms of generations, rather than years, whether we like it or not. A new colliery - or even a major reconstruction - is an "engagement" ... often for sixty years, sometimes for a century or more. The closure of an old colliery with substantial reserves left in it is normally a decision "for all time".'

It is unfortunate that current British Coal plans to rationalise the industry to a high productivity rump seem to be driven mainly by concerns over imports and the corporation's end-of-financial-year "credibility" as another candidate for eventual privatisation. In this respect, coal is being treated like any other commodity that is bought and sold on the market. The government is not giving enough weight to the need to maintain a strategic reserve of deep mines open to ensure flexibility in coal production planning and to avoid the sterilization of millions of tonnes of reserves. It also seems to be ignoring the potentially very bright medium and long-term prospects for using coal as a vital raw material for the feedstocks industry and synthetic gas (syngas).

9.3 Power plant decisions and the safeguarding of coalfield communities

Planning and coordinating the type, size and location of new power stations is critical if the UK is to have a regionally balanced electricity supply system into the 21st century. Power plant decisions have an important impact on a whole range of industries. Firstly, fuel decisions will influence what happens in the fuel supply industries. Secondly, the size of plants ordered and the distribution of contracts affect the fortunes of suppliers in the power plant and construction industries. Thirdly, a whole range of engineering, raw material, components, transport and other service industries are affected via their connections with the fuel and power plant suppliers. Given these inter-industry linkages, it is not surprising that decisions concerning the location of new power stations arouse political feelings. In addition to the potential economic benefits to local communities there are environmental costs, particularly as a result of polluting emissions from operational plants. All power plant decisions involve considerable employment and environmental costs and benefits, as well as opportunity costs and benefits based on consideration of alternative choices of fuel, size and location of plants.

A lack of a clear set of UK energy priorities up to and beyond the year 2000 has produced considerable uncertainties regarding the future shape of the ESI. Since the formation of the Central Electricity Generating Board (CEGB) in England and Wales there has been a tendency for power stations to become bigger and bigger. As a result the ESI is now dominated by very big stations linked together by the national grid system, whilst electricity production is optimized using high

performance turbines separated in a "merit order". Simply splitting the CEEB up into two big "privatised" companies is unlikely to alter the pattern of power supply very much. Nevertheless, the CEEB's "big is beautiful" policy towards power plant design and construction is threatened by a number of new technologies and their applicability to smaller stations.

One of the main uncertainties concerns the level of new capacity that will actually be needed at the end of the century. The CEEB estimates some 15,000 MW, equivalent to 16 very large turbine generator sets, will be required. In contrast, Caminus Energy, a consultancy company advising the area boards, believes that only 6,000 MW of non-nuclear plant may be needed (FI, 03-01-89:1). Whatever estimate is used, the CEEB's plans for at least three big power stations are being undermined. Planning approval for Fawley, near Southampton, which was to use 900 MW turbine-generators, is to be abandoned, partly due to a failure to reach long-term supply agreements with the local area distribution board.

There is added uncertainty regarding the future of the CEEB's pressurized water reactor (PWR) plans until the Hinkley Point Inquiry has reached a verdict. If the CEEB is given permission to build a second PWR it will push the case for new PWR's at other proposed sites (see Figure 9:1). The CEEB's plans to build big coal-fired plants and new PWRs would do little to help and much to harm the prospects of collieries and coalfield communities in the 1990s. One of the proposed coal-fired plants - Kingsnorth in Kent - would be a fuel importer. Another, West Burton would increase the tendency to concentrate virtually all deep mining capacity in the central coalfields of the

Midlands and Yorkshire. Neither the CEEB nor the Scottish electricity generating boards have shown much interest in building new small coal-fired stations utilizing advanced combustion and pollution-reducing technologies near to working collieries. South of the border new PWRs would displace coal from the power market in the long run, and deep mines in the peripheral coalfields or those located in areas near to new PWR's or power stations importing fuel will be the most likely victims. According to one calculation, a PWR the size of Sizewell 'B' will displace around 2.5 million tonnes of coal per year and destroy around 6-7,000 mining jobs (Fothergill, Gudgin and Mason, 1983).

There is potential for new small-scale power stations run by consortia interests and/or by area distribution companies after privatisation. One of the most important provisions of the electricity White Paper is "the non-fossil fuel obligation" (Department of Energy, 1988, Cmd, 322). Area distribution companies will have a statutory obligation to supply their customers' needs by purchasing at least 15-20 per cent of their requirements from non-fossil fuels. Opponents of the government have observed that this statutory obligation amounts to a thinly disguised "nuclear tax". As Sweet put it in a letter to the Financial Times (21-10-88).

'What hitherto was concealed is now to be legalised. The new distribution companies will be obliged to sign contracts to buy nuclear power above the average or marginal cost of power generation, and pass it on to the consumer.'

There is a possibility that renewable energy sources - biomass, wind, waves, tidal - will make a significant contribution. But for renewable

energy schemes to become widely adopted there is a need for positive discrimination in their favour. Hitherto, renewable projects have received only a tiny fraction of the research and development money that has gone into nuclear power and the fossil fuels. Furthermore, local authority rates levied on small-scale power suppliers are proportionately much higher than those on conventional large-scale plants. Privatisation may reduce some of these inequities, but not without a strong commitment from the state to back renewables and small-scale operators.

The geography of electricity supplies is important for the survival of deep mining jobs, coalfield communities and the mining infrastructure. Any proposition to diversify the UK's energy base will inevitably lessen the power market's reliance on British Coal in the long run. Similarly, effective energy conservation measures should reduce total energy consumption. New combustion technologies for smaller power stations and pollution-reducing technologies should be more widely adopted in the next decade. To ensure that such policies do not translate into thousands of coal-mining and mining-related job losses there is a strong case for investing in coal-fired capacity in areas where deep mines still operate. If strategic fuel choice decisions are left entirely to the private sector they will be made on the basis of current costs and profit potential. Private operators, if left to their own devices, may well choose the right kind of plant for their shareholders, but the wrong kind of plant for the local economy in which it is sited. In the medium and long term, the external diseconomies resulting from the initial decisions may far outweigh the perceived benefits in terms of profits to operating and distribution companies and cheap electricity to consumers.

Clearly there is a need to consider the social costs and benefits of power plant decisions. Privatisation of the power supply industry offers British Coal with some opportunities to form joint ventures with private capital to build small coal-fired stations. But without government support area distribution boards and the big privatised generating companies may decide to use imported fuel because it is cheaper or alternative fuels to coal, even in areas where there are local collieries. In the short term it will be the fuel choices for existing plant that will determine the fate of many pits.

Preparations for the privatisation of the ESI have already intensified production at pits and has increased competition between them for shares of the power market, which is effectively shrinking under the impact of imports. As internal competitive pressures build up so do the pressures to split up and sell off British Coal on an area-by-area and even super pit-by-super pit basis. It is critical for collieries to have forward supply contracts with power stations and with other large industrial and commercial users of coal. But the whole privatisation process has added to British Coal's uncertainties. Neither the generating boards nor the area distribution boards are willing to be tied down for long periods of time to one dominant supply source. Private companies want short-term operational flexibility so that they can switch to different fuel sources whenever prices fluctuate. Government regulation and legislation could help to resolve such uncertainty, but as is illustrated by the legal proceedings between the South of Scotland Electricity Board (SSEB) and British Coal, it is unwilling to intervene in such matters. Even though the Courts have finally favoured British Coal's position for a five-year

supply agreement with the SSEB, the government should never have allowed a dispute between two state-owned corporations to continue for so long.

The remaining deep mines in the "peripheral" areas are most vulnerable to closure on the basis of short-term financial and price arrangements. These pits have become progressively marginal in British Coal's corporate strategies as a result of deliberate restructuring, which has led to a higher proportion of pit closures in the peripheral coalfields. Consequently, British Coal has already taken the step of reorganising the administration of its Areas. Scotland, the North East of England, South Wales and the Western Area have all lost their individual Area status and have become "groups" under the auspices of Albert Wheeler, author of the Wheeler Plan, as Director of Group Operations (see chapter five). Whilst the remaining central coalfields retain their Area status, there is the possibility that they will eventually be compressed into two competing coal companies for privatisation (FI, 31-05-88).

It is important to consider each coalfield as a distinct area even though British Coal has lumped all the "peripheral" coalfields together for administrative purposes. However, each coalfield is not a self-contained coal market. Each one does tend to have its own natural market in the form of power stations built near to the pits (see Prior and McCloskey, 1988:99). As a case study for illustrating how damaging privatisation of the ESI and short term thinking could be, the following details focus on the North East of England. It is necessary to point out, however, that collieries in different coalfields will be affected by similar processes.

"Taking Coals to Newcastle" and other ports

The North East coalfield has traditionally been a coal exporting region. It still is, although the bulk of coal for steaming goes to the South East (Table 9:3). Thameside power stations account for some 30 per cent of the coalfield's total output. These power stations are probable coal importers in the early 1990s. According to Prior and McCloskey (1988:101-102) this fact makes the future prospects for the North East coalfield "clearcut and grim". Even with big productivity gains it would be difficult for North East pits to keep the Thameside market, particularly given the fact that transport costs from the North East or Rotterdam to the Thames are roughly equal. Only Ellington "super pit", and possibly Westoe, are likely to survive using ARA prices as a benchmark, unless the government introduces some form of protection, which is currently anathema to the Thatcherite leadership.

There is a further possibility that steam coal from Australia, Colombia and South Africa will be entering the North East in 160,000 tonne vessels by 1992/3. Plans have already been made to build one of Europe's biggest coal ports on the 300-acre site of a former Shell refinery on the banks of the River Tees. The local port authority is an independent statutory body so the scheme does not require parliamentary approval. In 1987 the authority handled 35.3 million tonnes of cargo, including large quantities of iron ore and coal for British Steel's plant at Redcar. Deeper port handling facilities, which would take two to three years to construct, would enable much larger coal tonnages to enter. It is estimated that up to six million tonnes of coal a year could be handled. About two thirds of the coal would be offered to private power plants; the rest could be shipped on

smaller vessels to coastal power stations and factories elsewhere in Britain and Scandinavia (FT, 03-11-88:7).

It is easy to see why such plans to improve port handling facilities represent a threat to remaining coalfields and their communities. Within an 80 mile radius of the Tees there are some 10,000 MW of coal-fired capacity. Blyth is the main coal-fired plant in the North East vicinity. Even without large tonnages entering the Tees, Blyth could become a coal importer. It is on a coastal site with reasonable export facilities, which could be rearranged for importing. Large-scale imports into the North East, plus a loss of the Thameside market, would kill virtually the whole coalfield. Tiny private mines and opencast operations would continue to operate owing to their much lower overheads and better productivity record than BC deep mines (see chapter five).

Comparisons of productivity can be very misleading, particularly in extractive industries. For reasons outlined earlier in this chapter it is more appropriate to base capital investment decisions on the long-term life expectancy of pits or particular seams. Nevertheless, even if British Coal productivity criteria are used as a basis for corporate decisions there is a strong case for keeping North East pits open. NE collieries are amongst the most productive in British Coal with productivity above three tonnes per manshift. In 1986/7 six of the Area's eight collieries were "million tonners". Many coal faces are now using retreat longwall mining methods, utilizing powerful-heavy-duty machinery. Premature closure of such pits would mean that BC will fail to capitalise on its own capital investments in selected coastal collieries. According to Prior and McCloskey (1988)

this would be an "economic tragedy". They do not base their arguments on an analysis of the social and economic multiplier costs of pit closures, but on British Coal's internal accounts. In 1987/8, using "bottom line costs", the North East Area averaged £1.57 per Gigajoule, which made it the cheapest producing area and one of "the biggest success stories in British Coal".

If all but one of the North East pits close it will mean a virtual end to seabed mining in Britain. British Coal has invested £millions into developing its offshore mines, which represent another area of "exportable" mining and technological expertise for both the corporation and suppliers. Pits have already closed in the North East in spite of having years of economic life left in them. As Hudson and Sadler (1987:10) noted, whether the proven or workable North Sea reserves "will be accessed depends upon British Coal's short-term criteria and seam selection". BC are currently arguing that more flexible mining shift patterns designed to lengthen the working day spent at coal faces and reduce the proportion of shifts taken up "travelling" to offshore faces is needed to increase the competitiveness of North East pits. In fact, the productivity of North East pits and new working practices will not save the coastal collieries after privatisation without state intervention to help secure their power station markets.

The North East pits are not the only ones under threat from imports. In South Wales, Milford Haven may be used as an import terminal for Aberthaw power station. One million tonnes could come in through Port Talbot to serve Aberthaw and Uskmouth stations, although Aberthaw is engineered to burn low-volatile Welsh coal (Dewhirst and

Gladstone, 1988:42). In Scotland, British Coal have failed to secure long-term supply contacts with the SSEB (see chapter four, 4:6). BC argue that its contracts with the SSEB to supply coal to Longannet and Cockerzie plants are legally binding until 1992 and 1995 respectively. Without long-term commitments the future of existing deep mines and the proposed £100 million Frances mine in Fife are in jeopardy. The government is unwilling to intervene to protect Scottish pits. In contrast, the government is apparently willing to camouflage the nuclear debts of the SSEB in the run up to privatisation, whilst the SSEB uses British Coal as a means to reduce its raw material costs (2).

Even if all new power plants in the 1990s are coal-fired it would not prevent pit closures in the interim period due to imports, government pressure and short term financial pressures due to electricity privatisation. Without state intervention the prospects are bleak for the remaining coalfield communities, and a lack of job opportunities in mining areas may lead to out-migration and the loss of non-mining business and services in those areas. Experience in County Durham illustrates the depth of the problem.

'Only a rise in the number of jobs in private services and self employment (in activities as diverse as window cleaning, garden centres, hypermarkets ...) prevented the "long-term job gap" from being worse. Already there is doubt about the durability of a "service sector" in the absence of a high wages manufacturing and mining sector' (Hudson and Sadler, 1987:8).

Chapter Six highlighted the significance of intra-regional and national level engineering linkages with coal mining. A proportion of these jobs depend on demand for new equipment from local collieries and

in turn, on the power station market. There are various power plant schemes under consideration by the North Eastern Electricity Board (NEEB), which plans "a huge investment in private power plants" after privatisation (Northern Echo, 05-08-88:4). Given the mining history and infrastructure of the North East it would be sensible to build on the resources, skill base and communities already in existence. This means building new coal-fired plant to use deep mined coal, rather than imported fuel or opencast output.

TUSIU (1987:17) have already calculated some of the benefits of building around five combined heat and power (CHP) plants in the region. Some 16,000 construction jobs would be created. Jobs would be secured in Reyrolle, Parsons, other NEI subsidiaries, and in suppliers of pipes, pumps, valves, steel fabrications and other equipment. In total, the knock on effects for the local economy would be much greater if coal-fired CHP-district heating schemes were adopted than if another nuclear plant is built in the region at the proposed Druridge Bay site (see TUSIU, 1987). Similarly, coal is more appropriate in the North East than utilizing other fuels, such as gas. In spite of this the Tyne and Wear Development Corporation are planning an £80 million gas-fired CHP scheme for Newcastle (3). Another possible scheme is a £70 million project between British Coal and the NEEB to build a 100 MW coal-fired station either located adjacent to a local colliery or on the banks of the Tyne somewhere between Dunston and Wallsend. Whilst the latter option would keep the possibility of using imported coal alive, such a plant has the potential of burning around one million tonnes of local coal per year, which is equivalent to the annual output of pits such as Westoe in South Shields or Wearmouth near to Sunderland.

Power plant decisions are clearly important to the medium and long-term future of the British coal mining industry. In the short-term, say the next five years, the government's financial pressures on British Coal, the attitudes and activities of the electricity generating and distribution boards, and world spot prices of coal, will continue to be dominant external pressures on the UK coal industry. There is an urgent need for positive long-term coal policies based on a recognition of the finite nature of fossil fuels; the irreversibility of pit closures; and the wider social and economic consequences of closures. It may prove disastrous for some local economies and coalfield communities if power plant decisions are left entirely to the private sector.

There are other urgent considerations which are just as important as the protection of jobs and communities in the long run. Coal burning has adverse environmental consequences, for it contributes to the "acid rain" problem and the so-called "greenhouse effect". This means that a fundamental part of any strategy designed to protect coalfield communities and utilize deep coal reserves must include measures to encourage the implementation of pollution-control and improved coal burn technologies to both old and new plants. As Beynon et al (1986:51-52) put it:

'To do otherwise is to run the risk of environmental costs which may not be as easily calculable in the short term, but which in the long term could be dire in their consequences.'

9.4 "Clean coal", environmental costs and privatisation

It may well be argued, as Willem Kakebeeke, a Dutch environmental minister did at the Clean Coal Conference in London, June 1988, that "the only clean coal is unmined coal" (4). But this argument does not help countries with a high dependence on coal for their fuel supplies. What is needed are positive measures to reduce pollution from and improve the efficiency of coal burning within a wider package of policies aimed at reducing total energy consumption and diversifying Britain's energy base. Sensible management of coal production with quotas on opencast output and limits on imports can minimise colliery closures. In environmental and social cost terms, probably the most damaging policies are those that seek to maximise output from a small number of "super pits" and opencast sites, whilst power suppliers are allowed to import low-cost coal from abroad.

This section examines how an energy policy that continues to be based on a high dependence on fossil fuels can be compatible with the long-term goals of improved energy conservation and reduced pollution from energy industries. The following section also discusses ways in which such goals can help to provide work in the UK's engineering industries. The simple fact is that reducing pollution from existing fossil fuel plants can involve almost as many resources, capital and labour as the construction of new plants. Whilst big financial costs are involved and may discourage private investors there are many potentially beneficial consequences, particularly in terms of a cleaner environment and employment creation (see also section 9:5).

There can be no doubting the connections between energy policy and environmental policy, nor the urgency of the need to cut polluting emissions from energy industries. One of the frightening conclusions of the Toronto Conference on "The Changing Atmosphere" in June 1988 was that humankind's collective subjection of the atmosphere to a mixture of global warming, stratospheric ozone depletion, and acidification, could ultimately have a consequence "second only to a global nuclear war". The Conference called for worldwide efforts to reduce emissions of carbon dioxide, one of the major "greenhouse gases". One of the suggested ways governments could do this is to introduce levies on fossil fuel consumption.

Hitherto, the British Government was quick to make public statements but slow to act on environmental protection. Thatcher's recognition of the scale and depth of the pollution problems facing the world to the Royal Society in October 1988 were applauded by sections of the media with headlines like "Maggie Joins the Greens" (Daily Mail, 28-09-88). But it is necessary to cut beneath the rhetoric and analyse the government's actions. With the Hinkley Point PWR Inquiry underway the government appears to be using the environmental case against fossil fuel burning to push its case that nuclear power represent the only "clean" and practicable option for Britain's energy future. Such arguments are backed up by reports, such as one by the Royal Institute of International Affairs (1988) that calls for all industrialized nations to cut coal consumption by turning to alternative forms of energy, including nuclear power. By advocating nuclear power in preference to fossil fuels the government is merely substituting one environmental hazard for another. This raises important questions.

One of which must surely be - how much can presently be done to reduce or eliminate potentially lethal emissions from energy industries.

It would be a very high risk strategy if one or other industry is allowed to expand when no reliable ways have been found to cope with its waste products. Looked at in this light there is still a strong case for investing in coal, because there are commercially viable technologies for reducing its polluting emissions, but there is no satisfactory method for reducing the nuclear waste problem without sizeable reductions in the industry itself.

One of the greatest pollution problems associated with power stations is "acid rain", which is caused by the preservation in the atmosphere of sulphur dioxide (SO_2) and nitrous oxide (NO_x) (see Pearce, 1986). There are two ways "acid rain" pollution can be reduced. The first is compulsory cuts in coal consumption (and production) which requires massive investment in alternative fuels. The second option is to invest heavily in the so-called "clean coal" technologies such as flue-gas desulphurisation (FGD) plants (Figure 9:2), low- NO_x burners, and improved methods of coal combustion; to implement energy conservation policies; and to have a long-term energy diversification strategy. Compulsory cuts in coal consumption would involve more rapid pit closures and generate huge social costs. Whereas the latter option would involve a much more sophisticated approach to energy planning than any government has been willing to try to date.

Britain has started to fit FGD plants to Drax 'A' and 'B' power plants and to Fiddlers Ferry station near Manchester, although work will not be finished until the mid-1990s. Whilst these measures should

abate some 450,000 tonnes of SO_2 per year they fall a long way short of European Community objectives to cut SO_2 levels from power plants by 60 per cent of the 1980 figure before the year 2003.

The government has also done little to encourage development of pressurized fluidized bed combustion (PFBC). The future of the experimental PFBC station at Grimethorpe, near Barnsley, is in doubt due to the withdrawal of CEGB funds (see chapter three, 3:7). Although PFBC will reduce sulphur emissions and improve power station end-use energy efficiency to 44 per cent, the government has not filled in the financial gap left by the CEGB's decision to pull out. Consequently Britain may never reap the benefits of a technology in which it is a world leader.

Similarly, in spite of its energy saving advantages, combined heat and power technology has not been widely adopted in the UK compared with other European and Scandinavian countries (5). CHP stations can run on various fuels, including refuse incinerations, and they use combustion methods that recapture the heat that is normally lost in conventional plants (see Figure 9:3). CHP is also particularly appropriate for district heating schemes. It is unfortunate that restrictive public spending limits may prevent local authorities from entering into joint ventures with private companies. The government has already withdrawn its support for a promising CHP venture in Lothian on the grounds that it was partially supported by local authorities (chapter three, 3:7). Such action is hypocritical given the state's interventions in the market in support of nuclear power.

If the long-term problems of environmental pollution are to be tackled seriously by the government there is a need for a flexible approach that recognizes the valuable contribution local authorities and community organisations can make (see section 9:6). Public expenditure cannot be avoided because the private sector is unlikely to be willing to incur many of the capital costs involved in reducing pollution levels. The private sector will tend to favour investments which:

- (1) have a reasonable certainty that plant can be built to time and cost. Plant which has long lead-times and perceived safety and environmental problems will be viewed as risky;
- (2) give a high return on capital;
- (3) are quickly implemented in order to start giving rapid return on investments;
- (4) require a short planning horizon.

In an imperfect market there is no certainty that private companies' investments will, in aggregate, match the national needs. There are likely to be conflicts between the interests of consumers and the need for profits. Without national energy targets and some degree of coordination of various independent power schemes the potential for such conflicts will increase. There are other interests at stake, such as those of workers in the energy industries, their families and communities, and longer term environmental considerations. Here the scope for conflict between the short term commercial interests of private capital and long term goals is even greater. The argument in this chapter is that with sensible energy planning, longer term goals such as energy security, environmental protection and nurturing local

economies dependent on particular fuels, particularly coal, are not necessarily mutually incompatible.

There are several ways in which the state could intervene even within a wholly privatised energy sector. Firstly, it can greatly influence the rate of extraction of non-renewable energy resources on land and in the North Sea. It can do so by adjusting its taxation policies and via regulatory bodies. Secondly, the state can influence the amount of fuel importation into the UK. Thirdly, it can play a crucial role in allocating funds for research and development (R&D) in energy conservation; improving end-use energy efficiency; pollution control; and in renewable forms of energy. In fact the privatisation of the ESI has raised one of the biggest dilemmas for the Thatcher government which was described by the editor of the Financial Times as

'the discrepancy between private and social costs that gives rise to pollution and other forms of disamenity has been used to justify the enhanced role accorded to the state in the 20th century - that same state whose regulations Mrs. Thatcher has been so anxious to roll back' (FT, 30-09-88:18).

There are many advantages to be gained by technologies such as FGD, low-NOx burners, PFBC and in CHP plants. Renewable projects also offer many benefits, and as Friends of the Earth (1988:28) have argued:

'If nuclear power does not stand up to effective competition, then it is only just that investment funds should go to alternatives which have been under-nourished during the 35 year "nuclear experiment".'

Renewable technologies in the UK are largely untried, and so unproven. They have received only a tiny fraction of public funds that have gone

into nuclear power, and to a lesser extent, fossil fuels. But as "emergent" industries, and like "clean coal" technologies and energy conservation measures, they will need a strong and long-term commitment from the state, and in the next few years, positive discrimination in favour of renewables.

The following section examines some of the potential employment benefits of policies designed to utilize fossil fuels in a more efficient and less environmentally damaging way, and of policies encouraging renewable energy projects to flourish. The remainder of this chapter is concerned with the economics of reducing pollution from coal-fired plants, which is relevant to debates about the future of the deep mining industry. The costs of pollution abatement should form a critical part of any assessment of appropriate energy policy and in choices between energy industries. The cost of flue-gas desulphurisation schemes is used as an illustration.

If Britain is serious about meeting European Community directives on cuts in environmental pollution, there would have to be a fall in SO₂ levels from the 3.03 million tonnes recorded for 1980 to 1.21 million tonnes by 2003. It is estimated that the cost of meeting this "pollution quota" is around £three billion, or about the cost of two and a half PWRs the size of Sizewell, although Sizewell's construction costs could rise if there are any delays or technical difficulties. Technica Consultancy presented a study in 1988 on strategies to reduce acid pollution for the Department of Energy. The author of this report, Philip Comer, told a meeting of the British Consultant's Bureau in London in October 1988 that:

'with only a modest increase in electrical energy consumption, the DoE targets for pollution abatement will not be met ... There is a divergence between stated policy and achievable objectives ... To meet the 60 per cent reduction (in SO_2 between 1980 and 2003) implies fitting clean-up equipment to plant with a capacity of 29,000 megawatts. This is effectively all the CEEB's large coal-fired power stations' (quoted in New Scientist 22-10-88:29) (6).

The Department of Energy is concerned that stringent European Community objectives and targets on the reduction of "acid rain" and "greenhouse gases" will reduce the price of the CEEB when it is privatised. The government is less willing to subsidize fossil fuels, particularly coal, than it is to support the nuclear industry. It has already ruled that private generating companies should bear the costs of curbing pollution, which may deter some potential investors in the industry. The electricity generating boards claim that a full FGD programme for all conventional stations could add as much as three per cent to electricity costs and ten per cent to the net running costs of power stations fitted with FGD (FT, 24-11-88:11)

Professor Fells suggests that

'the additional cost of equipment to remove sulphur dioxide from the emissions of coal-fired plant may tilt the financial advantage back to nuclear stations' (New Scientist, 11-02-88:39)

But this suggestion is flawed and misleading. New PWRs would indirectly cut down acid rain in the long term by replacing coal-fired capacity, but they would not create a more benign energy supply system without solutions to the industry's own emissions and waste by-products. If there is to be a meaningful financial comparison

between nuclear power and its alternatives it is necessary to include the full economic costs of ensuring operational safety at existing plant, decommissioning old nuclear plant, and ensuring that nuclear waste is safely managed, which is a problem that will last for thousands of years.

Although a full analysis of pollution abatement costs is beyond the scope of this thesis, it is possible to present a strong case for investing in pollution reducing measures for the coal industry rather than in nuclear power by using common sense. The House of Common's Energy Committee suggested that the cost of decommissioning one reactor lies in the range of £250 million to £750 million depending on the size and type of plant (1986/7 session). These costs are to make unproductive plant safe. The costs incurred to reduce pollution at coal-fired plants help to make productive plants safer. Furthermore, the higher energy efficiency gained by using advanced coal-burning systems in new plants would help to

'compensate for the extra cost of achieving stricter emission control rather like saving on fuel bills to pay the overheads' (Gibson, 1986:14).

In addition to utilising advanced coal-burning technologies and flue-gas desulphurisation techniques the government could encourage the use of coal with lower sulphur content in power stations. On the calculation that the costs of utilising pollution-reducing technology are equal to around £500 to £1,000 per tonne of sulphur removed, Friends of the Earth (1988:20) estimated that coal with only one per cent sulphur content would be worth £five to £ten per tonne more than coal with double the sulphur content. FOE argued that an earlier

recognition of the relatively high value and potential savings of using lower-sulphur content coal would have helped prevent many pit closures in areas where such coal is mined, including parts of the North East and Scotland. Even so, there is a very limited availability of low sulphur coal, and the environmental arguments should not be used as an excuse for the importation of coal and to forgo investment in pollution abatement technology in Britain.

It is true that no matter what type of coal is burnt in power stations and no matter what methods are employed to burn coal, coal can never be completely clean. There is no technical solution for reducing carbon dioxide emissions which contribute to the so-called global "greenhouse effect". The International Energy Agency has produced figures that show carbon dioxide emissions from all the world's coal-fired power stations account for as little as six per cent of all man-made radiative "greenhouse gases" (7). This prompted the deputy chairman of British Coal, John Northard, to tell delegates at the "Minescape 88" Conference at Harrogate that a switch from coal to other fuels in the UK would have a negligible impact upon the "greenhouse effect" (BC Press Release, 08-12-88).

Whatever the precise contribution of coal-burning to the "greenhouse effect" there is no room for complacency. Arguments favouring the protection of deep mining and coalfield communities must include positive measures for the long-term protection of the environment. The success of some of these measures will inevitably reduce the overall demand for fossil fuels. The crucial point is that an appropriate balance of policies can reduce polluting emissions from

energy industries without the wholesale destruction of mining jobs, the deep mining infrastructure, and coalfield communities.

Concepts of "economic" and "efficiency" are often used for decision-making purposes when investing huge sums of money into one energy source or another. These terms are often based on narrow financial and accounting criteria and underestimate (or ignore) many of the indirect and social costs of major investment decisions. As FOE (1985:4) put it:

'the terms are open to extremely wide interpretation ... depending upon the parameters and input data chosen, and the different perceptions of the ideal society by the decision-makers and others.'

This section has examined some of the environmental costs of a coal-based energy policy. In assessing the value of applying pollution abatement and advanced coal combustion technology it would be helpful to apply an alternative form of energy accounting called "energy analysis" which considers the energy inputs required for a given output. This approach would favour investments which required lower energy inputs and a higher proportion of "end use" or "useful energy" for a given capital investment (see Figures 9:4 and 9:5). It would also favour investment in measures to reduce energy demand at all levels of society. This would include a broad-based package of conservation measures, such as investment in energy efficient buildings, appliances, machines and power plants.

Undoubtedly, energy conservation policies would be some of the best ways to reduce energy bills in the medium and longer term and to

reduce pollution levels. According to one EEC Commission communication to the Council of Energy Ministers on 27 October 1987, a ten per cent electricity saving in the European Community by the year 2000 would reduce acid emissions from power stations by 325,000 tonnes and new power plant capacity requirements in Europe by 40 Gigawatts (GW). The reduced demand for coal need not be destructive of coalfield communities and linked jobs to the mining industry if there is sensible management. In the UK, energy conservation measures would have to be accompanied by restrictions on imports and strict regulation of opencasting (see chapter seven).

Hitherto, the government has not shown much enthusiasm for many of the ideas expressed here. Concepts such as end use energy efficiency do not seem to be very prominent in debates about the future of the electricity supply industry. The government seems to have twisted the environmental issues into a case for nuclear power. Whilst there can be little doubting of the need to restructure the electricity supply industry and to make the industry more responsive to consumers and social needs, long term environmental and social problems associated with energy supply will not be solved merely by transferring "ownership" to the private sector. So-called "market forces" and privatisation will only tend to reinforce short termism. The policies suggested in this chapter require a great deal of long-term planning and responsible state intervention, which is anathema to the politics of Thatcherism. The following section returns to one of the central issues in this thesis - jobs.

9.5 Employment Trade Offs

The jobs issue is at the heart of divisions in Britain's labour movement concerning what energy priorities and policies the Labour Party should adopt. Deep divisions exist between unions with members involved in different energy industries. Probably the most marked divisions have been between unions with members in the nuclear industry and the National Union of Mineworkers (NUM). There are also splits within unions, particularly those unions with members in each of the main energy industries. An example is the Amalgamated Engineering Union (AEU) which is one of the strongest advocates of the civil nuclear power programme at national level, although it has just as many members, if not more, in the engineering supply firms for the offshore oil and gas industries and it is the dominant union in the mining machinery industry.

It is important to put the employment arguments in perspective. Too often employment data is distorted in order to justify particular investment decisions. This has been the case with opencast mining. Management, government and union supporters of opencasting have frequently used the job creation argument to support new open pit proposals, but they never explain the connections between new opencast capacity and cut backs in deep mining in an era of over-capacity (see chapter seven). The energy sector should be viewed as an interrelated whole, and not simply as separate fuel industries, each with competing sectional interests. If one energy industry is given priority over another it will have positive and negative employment repercussions respectively in each industry. Although the complexity of inter- and intra-industry linkages means that the jobs "trade offs" are not always

very clear. Some clarification of the jobs issue is needed, especially between the coal and nuclear industries, for it is divisions between supporters of these industries which has prevented the Labour Party from taking an unequivocal stance on energy policies. Whilst environmental and nuclear politics can and do cross party political barriers, it is largely the case that the Conservative Party has not questioned the need for civil nuclear power but have debated what form and shape the nuclear industry should take. The following details are an attempt to summarize the main points with regard to comparisons between nuclear industry and coal industry jobs.

Whatever fuel is used, all power stations need people to run them. Power plant decisions will create thousands of jobs in construction, operation and maintenance. Whilst there are around 37,000 jobs directly associated with the civil nuclear industry an equal number of jobs, if not more, could be created by building fossil fuel plants (Fothergill, 1986). It is also true that many existing jobs in the nuclear industry are not immediately at risk even if there was a sudden reversal of state policy and support for the nuclear industry. A large proportion of skilled technicians and scientists would be needed in any phasing out programme for at least 15-20 years. The very nature of power plants and the technical complexities of decommissioning plants and handling nuclear-waste make sudden plant closures an impossibility in the sense that many people would still be needed to keep unproductive plants safe. Similarly, it should be possible to keep many research and development staff employed, either engaged in decommissioning, safe plant maintenance and waste handling work. Alternatively, they could fill suitable posts in other areas of energy R & D which would presumably be allocated more investment funds.

Fothergill (1986) noted that it should be possible for the electricity generating boards to redeploy power plant workers made redundant at nuclear stations elsewhere in the ESI. In total, he estimated that over a third of direct employees in the civil nuclear industry would maintain their jobs by the year 2000 if a programme of phasing out nuclear power is implemented.

The simple fact that coal is mined in the UK but uranium is not means that the coal industry employs tens of thousands more direct employees than does nuclear power. This is in spite of the loss of almost 600,000 jobs since nationalisation in 1947. In the third quarter of 1988 British Coal employed around 87,000 underground workers out of a total workforce of some 114,000 people. The whole of the civil nuclear industry, including its supplier networks and research development establishments probably employ no more than 100,000 people, which is an estimate supplied by the British Nuclear Forum (AEU Journal, April 1986:15). In addition to direct jobs, mining incomes are important to whole communities for they help to support local services and welfare amenities (Hudson, Peck and Sadler, 1984).

It is also true that coalfield communities and jobs related to coal mining, in power stations and engineering, are found in many localities, whereas large nuclear facilities are sited mainly in relatively low density population areas. Nevertheless, like other energy industries, the nuclear industry is a dominant employer in particular localities. A nuclear "phase out" policy would have to tackle the issue of providing or generating new jobs in places dependent upon jobs in nuclear installations. For example, British Nuclear Fuels Limited (BNFL) employs around 8,000 people at its

reprocessing facilities at Sellafield in Cumbria. This makes it the dominant industrial employer in the vicinity. Similarly, the Dounreay fast reactor plant in Caithness employs nearly a tenth of the 27,000 population of the country, and several thousand more people depend in some way on the plant for their livelihoods (FT, 25-11-8:6). Owing to the isolation of the plant's site the problems of economic dependency upon it are great.

Another important aspect of big energy industry capital investments is their positive multiplier effects on the engineering industry. The nuclear industry provides work, often in very big contracts, to many of Britain's large engineering companies. In fact, "the jobs in manufacturing" argument is often used by vested interests within the British nuclear establishment to justify the immense resources devoted to civil nuclear power. In 1986 the Director of the British Nuclear Forum, Comer, claimed that BNFL's £3.7 billion investment programme would support some 50,000 jobs in the UK manufacturing sector, plus some 5,000 people in construction work (AEU Journal, April 1986:15). BNFL has provided work for numerous suppliers, including NEI Parsons during its lean years in the UK power plant industry. Undoubtedly building and equipping new PWRs will provide thousands of jobs in the UK even though the main contractor is Westinghouse of the US. It is estimated that 90 per cent of the total anticipated £1.6 billion capital expenditure on Sizewell 'B' will go to British-based companies (FT, 03-04-87:6).

The jobs created by nuclear capital are sometimes used to support or strengthen the case for the whole civil nuclear power programme. Nevertheless, it is useful to point out some facts which put the

employment creation value of nuclear power in a broader economic and social perspective. Firstly, most of the big names supplying the industry, such as GEC, Whessco, Davy McKee, NEI, Babcock, Weir Pumps, Hawker Siddeley, own subsidiaries engaged in contacts for other energy industries. Further research would be needed to clarify employment trade offs of major energy investment decisions within the UK operations of engineering groups with over-lapping commercial interests in different energy industries.

Secondly, there is a need to make some comparisons with other industries. The fossil fuel industries are much greater employers than the nuclear industry for the simple reason that they are mined or extracted from British soil or from the seabed. The North Sea oil industry is a major employer in the UK. Direct oil industry employment in Scotland accounted for around 53,500 people in December 1987. This was based on a conservative definition of "wholly" oil-related work used by the training Commission. In fact, the total number of jobs, if offshore suppliers and fabrications companies are included, will be higher, although employment in offshore work fluctuates according to oil price movements and the fortunes of companies engaged in oil-related activities. An illustrative example of the effects of the North Sea oil boom in the 1970s - early 1980s was the rapid rise in Aberdeen's population from 60,000 to 250,000 people (FI, 23-08-88:17).

As noted earlier, the British coal mining industry employs more people in coal production than the entire UK nuclear power industry. According to the British Nuclear Forum there are as many as 60,000 jobs involved in the manufacture and supply of capital goods to the civil nuclear industry. As in the mining industry this total figure is

difficult to verify. It is roughly equal to the number of jobs estimated to be involved in supplying capital goods for coal mining and preparation (see chapter six). Many of the suppliers to the nuclear industry will be in the power plant industry. If no new nuclear plants are built these same companies are likely to be engaged in supplying advanced combustion technologies, flue-gas desulphurisation units and other "clean coal" technologies. Thus the negative job impact of freezing or phasing out Britain's civil nuclear programme could be minimised by the creation of jobs involving many of the employees who would have been working on equipment for the nuclear industry. If the trend is towards small-scale power stations, the power plant suppliers would benefit from a more even ordering programme than the CEGB's policy of building big conventional and nuclear plant allowed. This would end "the boom or bust" scenario faced by suppliers such as NEI Parsons and Babcock Power at Renfrew during the last decade (see chapter six, Part two).

There would probably be more job gains than losses from a non-nuclear energy policy,

'Assuming that the additional demand for coal is not met by imports, the main job gain from a non-nuclear energy policy would be in the coal industry ... By the year 2000, if all the nuclear power stations were closed and the use of the Channel link restricted, coal mining employment would be nearly 40,000 greater. This compares with an estimated job loss in the nuclear industry ... of 26,000' (Fothergill, 1986:54-55).

If a bold non-nuclear energy policy was implemented, there would be job gains in the construction and engineering industries because new power plants would need to be built in place of the Advanced Gas-cooled

Reactors (AGRs) and more PWRs. The reality is that the Thatcher government of the late-1980s is pressing for more nuclear capacity to replace the loss of 3,000 MW of generating capacity from old Magnox reactors. In his evidence at the Hinkley Inquiry, Christopher Wilcox, a senior Department of Energy official, argued that nuclear power could replace a further 4,000 MW after the phasing out of old coal and oil stations. He argued that renewable energy schemes were subject to technical, environmental and economic uncertainties, but he ignored the considerable doubts surrounding the nuclear industry. He suggested that renewables could not be expected to make an economic contribution until the late 1990s, which made nuclear power, according to his selective reasoning, "the only viable non-fossil fuel source" (FI, 27-10-88:6).

The arguments of Wilcox are fairly representative of current state policy. The nuclear establishment is very powerful in Britain, and in spite of stiff and well researched opposition at the Hinkley Inquiry a new PWR may be given the go-ahead. Together with the short term decision to allow into the UK coal produced in other countries, new nuclear capacity would be another death blow for deep mining. Nevertheless, in an era of cutbacks in publicly funded research and development, the nuclear industry is not without its problems. Economic reality has eventually hit the Dounreay fast reactor programme, which aimed to obtain from a given amount of uranium at least sixty times as much energy as present day reactors. The government's cut in Dounreay funding from £45 million a year, which is more than double the total sum allocated to renewables, to £10 million by mid-1989 is almost certainly going to mean an end to the prototype 250 MW fast reactor station by 1993/4. In turn, this will undermine

BNFL's giant Thermal Oxide Reprocessing Plant (THORP), which is designed to produce plutonium and uranium for recycling fuel for fast reactors. THORP is due to come on stream by 1993, but it may well prove to be "the biggest and most expensive white elephant in British history" (The Independent, 31-10-88).

The case of BNFL raises other important regional development issues. BNFL's Sellafield plant is based in Cumbria, to the west of the north Pennines and part of the "standard North". On the east side of the Pennines is the North East of England, which is traditionally a coal-mining area although there is the Hartlepool AGR. Similarly, Cumbria also has coal mines, but the nuclear industry accounts for a larger number of jobs. BNFL and the Trident submarine yard at Barrow are dominant industrial employers in Cumbria. This effectively makes the local economies of Sellafield and Barrow very dependent on the civil-cum-military nuclear power industry, which has helped keep average unemployment rates below ten per cent in Cumbria compared with over 20 per cent for males in the North East and around 16 per cent for females (FT, 30-11-87 : Northern England Survey).

BNFL's wider involvement in the local economy, such as its contribution of £one million a year as part of a joint initiative with Copeland Borough Council and Enterprise West Cumbria to foster small business growth, and its direct employment of some 8,000 people in Sellafield, mean that there is considerable local resistance to the activities of pressure groups opposed to Sellafield's activities (8). For self-preservation the union's representing workers at nuclear plants are unwilling to alter their pro-nuclear position. Nevertheless, there is evidence to suggest that the economic price of maintaining

jobs in the nuclear industry is very high and that BNFL has been a mixed economic blessing in terms of regional development within Cumbria. The SERA Energy Group in 1986 claimed that the Whitehaven travel-to-work-area (TTWA) lost its assisted area status after 1984 due to excessive claims for regional development grants (RDGs) by BNFL (Sellafield), which lies within the Whitehaven TTWA. Between January 1977 and March 1985, at which time the Whitehaven Area lost its assisted status, BNFL received some £136.2 million in RDGs for investment in West Cumbria, or about 77 per cent of all RDGs allocated to the area in that period. The same study estimates that approximately 2,000 jobs may have been created by BNFL from RDG money between 1977-85, which represents a cost to the taxpayer of £68,000 per job.

'Even the most expensive job creation subsidy elsewhere in the UK (eg for motor car factories or oil refiners) rarely exceeds £35,000 per job' (SERA, 1986).

There is a disparity between the government's approach to the nuclear industry and the coal industry. Although Cecil Parkinson has argued that under a privatised regime the private sector will decide whether or not to invest in the nuclear industry there should be no doubt that the industry can not survive without continuous state support and public money. In the United States private capital has virtually abandoned the civil nuclear industry. This section has tried to show only one aspect of the debates about the future of Britain's energy sector, ie the employment arguments. The simple fact is that policies designed to run down the total deep mining capacity in the UK, but couched in terms of making the industry more competitive, are leading to thousands of job losses in the mining and mining related sectors of the national economy (see chapters five and six).

Commercial and financial criteria underlie many of the pit closures that have and are taking place, but there has been no attempt by either the government or British Coal to count the true social and economic costs of pit closures. Short term thinking dominates as preparations are laid for the privatisation of the electricity supply industry. British Coal is proceeding with more cut backs. The miners and their communities are victims of the process over which they have little control. Since the 1984/5 strike many miners have opted for voluntary redundancy when faced with what is in many cases the only other option of compulsory redundancy. The rapidity and scale of pit closures has not helped coalfield communities in their efforts to diversify their economies and create alternative sources of employment. This means that many redundant miners eventually are forced to leave their communities in search of jobs elsewhere. Few are given work at other pits.

This chapter has examined some of the links between energy industries and has argued the need for long term planning in the UK energy sector, which should be a primary responsibility of the incumbent government. A central argument throughout the thesis is that an energy policy or policies should be developed on indigenous skills, people and resources. This means policies that build upon existing foundations. In the coal mining industry most government policies have done much to destroy the deep mining and mining engineering infrastructure. Because coal is still the UK's major non-renewable energy resource such policies will leave the UK vulnerable to international fuel markets and the activities of multinationals with stakes in energy industries (see chapter eight).

Pro-coal policies, such as protection from imports, encouraging long-term supply contracts with power suppliers, and sensible measures to improve end-use energy efficiency at old and new power plants, would do much to protect (and create) jobs in both the mining and mining related sectors. It has already been suggested that conservation policies based on maximising coal out take or extraction rates at existing pits, as opposed to simply raising productivity indices from a diminishing number of pits, would benefit mining machinery suppliers (see chapter five and section 9:1). The introduction of improved combustion and pollution reducing technologies for power stations would also benefit engineering companies in the power plant industry.

It is a fact that the construction of flue-gas desulphurisation units (FGD) involves almost as many resources as the building of new conventional power plants. A full-scale strategy to reduce acid emissions from existing stations would generate several years work for many companies and thousands of man-years work in the steel, construction and engineering industries. This is illustrated by experience in West Germany where FGD plants are being fitted to all fossil-fuel power stations. Most of these use limestone-gypsum "scrubbers" which is the method the CEEB has opted for. In West Germany, four lignite burning stations with a combined capacity of 9,300 MW were fitted with 37 FGD scrubbers. To do so required :

- 3,000,000 tonnes of steel or enough to erect 42 Eiffel Towers;
- 380,000 cubic metres of concrete or enough for a 50 mile long, six lane motorway;
- about 30 km of flue gas ducts, nine metres in diameter or enough to build a third of the Channel Tunnel (FT 25-01-88: 'Electricity Survey').

Building new power stations using advanced combustion methods such as CHP technology would also generate much work for the UK engineering industry (Gibson, 1986). Unfortunately the government has resisted parliamentary pressures upon it to introduce tight regulations and inducements to encourage private sector electricity utilities to introduce energy conservation measures (FT, 18-01-89:13). There is also great uncertainty over the future of the pilot pressurized fluidised bed combustion plant at Grimethorpe, which needs an injection of around £ten million from the British government to maintain its operations. The government seems to be unwilling to put any money at all into projects that would benefit the British deep mining industry.

It is not enough to advocate policies to help Britain's fossil fuel industries. Greater investment and more public support for renewable energy supplies would help to create a more sustainable energy future for all. Renewable energy industries also have potential job creation prospects for coalfield areas and remote rural and coastal locations, as well as for British engineering companies. This was recognised by Dr. Phil Williams, Plaid Cymru's vice chairman of research and policy, who believes that research into wind power at Camarthan Bay could be the start of a major new industry in South Wales, and not simply a one-off experiment. Plaid Cymru argue for an industry that can become "as important as coal in the past", providing work for construction workers, engineers, scientists, designers and sales personnel (Western Mail, 05-12-88).

One of the most persuasive cases for launching the wave energy programme in the 'seventies was the provision of employment. Various traditional and heavy engineering industries would be required to

provide the structures, components and raw materials, which would involve the shipbuilding, steel, construction engineering and power plant industries. There are various types of wave energy device. Some float, some stand on the seabed, some are submerged, but they all go to sea, and as such require the kind of craft skills found only in the shipyards. Most wave power devices are small compared to other offshore structures, and they could easily be assembled, then floated to site.

Shipyards are effectively large open-air factories, so it is possible to use their facilities for production other than for actual ship construction. Wave energy projects represent one way that redundant workers in coastal towns could be usefully employed. Tyne and Wear, the Clyde, Humberside, Belfast could all benefit. As phasing out Britain's nuclear programme would generate additional unemployment it is necessary to consider potential alternatives. Sites like Barrow near to Sellafield and Dounreay are places where the nuclear industry dominates local employment, but they also offer workers with the necessary skills and experience to deal with the problems of providing energy and/or coping with the sea.

Ross (1986) examined some of the resources required to develop alternative wave energy generators. He estimated that a 2,000 MW power station of "Cockerell Rafts", designed by Sir Christopher Cockerell, inventor of the Hovercraft, would need 400,000 tons of steel per year for ten years. This would provide around 1,900 jobs for a decade, that is about half the output of Consett steel works, which employed 3,800 people before closure (Ross in The Guardian, 05-06-86:25). The "Salter Duck" floats as one of a line of generators. Ducks would need large quantities of steel, electrical cabling, mechanical handling and

hydraulic equipment. Even the government's own consulting engineers - Rendel, Palmer and Tritton (RPT), who did much to make the wave energy programmes look economically unacceptable in 1982, admitted the potential employment benefits from an extensive wave energy programme. RPT noted that jobs in the wave power industry would be more stable than those in the offshore industries, and that wave power schemes could provide "skilled local employment for a generation or more".

Clearly there is plenty of scope for more imaginative energy policies in Britain than have hitherto been tried. Positive conservation and environmentally sensitive policies towards the coal industry can provide many thousands of socially-useful jobs in related industries - mining, engineering (mining machinery and power plant), electricity generation and supply. In addition, the sensible siting of new coal fired power plants in areas of deep mining activity is one way to maintain and create jobs based on existing resources, skills and communities. Coal mining needs state support, and so do efforts to diversify the UK's energy base while simultaneously encouraging greater energy conservation. There is the danger that privatisation plans and sectional commercial interests will override the need for coordinated and long-term production planning in the UK energy sector.

A contention throughout this thesis has been that in spite of the loss of half a million jobs since 1960 the jobs issue is still the most critical one for the coal industry. It is the author's view that sensible management of Britain's energy sector could simultaneously reduce future demand for fossil fuels without developing new nuclear capacity, and do so with minimum colliery closures. But for this to be achieved there would need to be fundamentally different objectives to

those currently governing the industry's future. The Thatcher years have witnessed the deliberate diminution of social responsibility in the nationalised coal industry for coalfield communities. Although the industry was destructive of jobs and communities before the first Thatcher government, it is only during the 'eighties, and particularly since the miners' strike, that British Coal has become like any other "private" business and put "money before tonnes", short term finances before long term production planning. Privatisation plans have intensified the ceaseless drive for productivity growth that has been one of the most socially destructive forces in the industry since the late 1950s.

9.6 Energizing Local Economies

"China mines talents from Doncaster" ran one headline in The Guardian (10-11-86:1). A small number of redundant workers and managers from Doncaster were being sought by the Chinese authorities of Dandong, on the China-Korea border, to work in the province's factories for a year. A Chinese delegation was sent to scout for talent in the pit closure areas, British Rail workshops, further education colleges and specialist manufacturing firms, which include mining suppliers. Doncaster councillor, Ron Gillies observed:

'They'd really done their homework. They knew that this was a place where they'd find men over 50 on the scrapheap but with skills their people would like to learn.'

Like Doncaster, Dandong has coal mines, railway workshops and textile mills, which was what attracted their local authority's interest in the

Yorkshire town. At the time of the visit by Dandong officials Doncaster's unemployment rate was over 21 per cent and there were some 23,000 people officially defined as unemployed and many more without full-time employment.

Doncaster is just one of numerous examples of towns where a large proportion of the working population who are unemployed cannot find local jobs. In common with many other localities it has been unable to cope with the rapidity and scale of decline in the traditional industries. The only answer for many job-less people is to seek work in other localities, which disrupts families and ruptures communities. Few workers have the desire or the opportunity to go as far as China, but many seek work in other parts of Britain, particularly in the prosperous South East where they cannot afford to buy homes for their families.

This thesis has examined some of the likely consequences of the privatisation of the electricity supply industry and other policies on jobs in both coal mining and in engineering. The inescapable conclusion is that more job losses, pit and plant closures are going to happen unless there is a concerted effort on the part of central government to prevent this by changing, and in some cases, reversing current policies.

Little attention has been devoted in this thesis to the thorny problem of alternative approaches to create job opportunities for communities dependent on mining or engineering plants supplying either the coal industry or the electricity supply industry. However, it has been suggested that long term energy planning and positive coal

policies would do much to protect the whole mining infrastructure and prevent wholesale job losses in surviving deep mining communities. Some ideas for developing renewable energy resources were also put forward in the previous section. Unfortunately such policies would not benefit all coalfield communities afflicted by pit closures.

Hitherto, the central government has tended to prefer "top down" approaches to the problems of unemployment that tend to by-pass local authorities and rely heavily on private consortia. These approaches may be useful for certain big urban development projects but they are inappropriate to tackle the widespread and deep socio-economic problems created by pit closures and consequent job losses in other parts of the economy. Similarly, the creation of various types of enterprise organisation from the ashes of closed shipyards, steel works and coal mines, with limited budgets to retrain workers and to subsidize small employment schemes, has proved to be a totally inadequate response given the enormity of the industrial decline faced by numerous localities within the UK.

Once a dominant industry like deep mining declines a whole range of adverse knock on effects are set in motion. Local authorities and enterprise agencies lack the resources to tackle the numbers of job less people in their areas. They often have to compete against similarly hard-pressed authorities for various regional aid funds available nationally or from the European Community. Local authorities have also tried reindustrialization schemes and set up Enterprise Zones. Such schemes are divisive if examined from a UK-wide perspective. They tend to generate inter-and intra-regional competition between different local authorities and development

agencies trying to attract mobile capital to their respective localities by offering surplus profit potential. Put simply there are not enough Nissans or Toyotas to go around. Only a few localities are successful in attracting international capital. Multinational corporations are able to pick and choose between various sites within Britain and in other parts of the world. Even if a particular area does attract inward investment, branch plants are often the first to close in times of economic downturn or due to the corporate strategies of parent companies.

The simple point that should be stressed is that it is much harder to create new jobs than to destroy old ones. It is not feasible to argue that areas such as the South Yorkshire coalfield, Strathclyde, Tyneside or Wearside should forget about their industrial past and build up a new industrial base and/or rely on service-sector jobs unless one is talking about time spans of at least two or three generations. It is important for decision-makers to realize the need to base their policies upon existing foundations, which means the people, resources and skills of the different localities within the UK. If this is done there is a chance that further pit closures can be avoided, and of introducing energy policies that actually seek to build upon the accumulated experience, skills and knowledge of people working within the mining and related industries.

Sensible energy planning and policies can help to energize local economies in several ways. But to be successful they require a high degree of cooperation between central and local government across party political divides, as well as the active participation of local people. For example, for CHP - District Heating schemes to be more widely

adopted in the UK the central government should allow joint public-private ventures or purely local authority initiatives to flourish. Unfortunately the current government is unlikely to support publicly funded schemes due to its tight public spending limits imposed upon local authorities. There may also be political motives underlying the state's lack of support for schemes that would benefit the deep mining industry and so bolster the strength of the NUM, and others in the steel, boiler makers', transport and engineering unions (see Feickert, 1985:252). The government's preference for private sector funding for new energy projects means that most investment decisions will be based on profit potential, and many of the wider linkages and socio-economic costs and benefits of those decisions will be ignored. Furthermore, it is a fact that job creating investment by the private sector is notoriously low in most coalfield areas, and it is therefore the public sector which must take the initiative (Coalfields Communities Campaign, 1986).

Not all energy policies would create many permanent jobs, but some, like a housing and heating policy for low-income groups, would help to make life more pleasant and rewarding. So far the Thatcher government's record in the domestic heating sector is a poor one. During "Energy Efficiency Year" in 1986 the government spent more on advertising the sale of British Gas than on energy efficiency improvements for low-income households. The National Right to Fuel Campaign urged the government to provide substantial capital investment to relieve fuel poverty in Britain. The campaign group called for state legislation and economic incentives to improve insulation methods, building designs, and to guarantee economic heating for low

income households. It was suggested that funding could come from the £five to £six billion realised from council house sales (The Guardian, 24-11-86:20).

The beauty of many energy conservation schemes is that they need grassroots support if they are to be successful. There is scope for "bottom up" approaches to be applied to energy matters to a much greater extent than they have been. Chapter Five briefly discussed how production decisions in the coal mining industry have largely by-passed the majority of people who work in the industry. Nationalisation did little to alter basic capital-labour distinctions and relations. At a broader level, both central and local governments have done little to involve grassroots community groups in the main tasks of planning and implementing energy efficiency schemes. Residential groups and housing cooperatives may be the most effective means to implement energy saving ideas for households and community facilities. In coalfield communities several groups could be encouraged to cooperate, including the NUM, miners' wives groups, local authorities, voluntary organisations and church groups. As Young (1986:17-22) observes,

'If local people are involved in a positive way identifying local problems and local needs, then projects are more likely to survive and make a positive contribution to improving living conditions. This is especially the case in close-knit communities where the commitment to local people is so important if projects are to achieve their ends...
Many of the elements needed for success are already there in the coalfield communities. What the government has to focus on is the sensitive injection of the missing ingredients.'

It is an economic and social tragedy that the current preoccupation of the government is with preparations for privatising the remaining nationalised industries within the UK energy sector. It is doing so with little consideration of the complex policy linkages and inter-industry linkages involved. It is also side stepping urgent issues such as what to do with the communities and people made redundant in the process of privatisation. As this thesis has attempted to show, these include many thousands of people, both within and outside the mining industry. It is also clear that some sections of private capital are also losing out as a direct result of the rundown of the nationalised coal mining industry.

It is very doubtful that many of the issues and conclusions raised in this thesis are in the minds of senior decision-makers as they prepare the way for the privatisation of the electricity supply industry and formulate policies affecting the UK energy industries. But if this research helps to throw at least a little more light on some of the complex issues involved in the privatisation debate, and helps to generate further discussion and research amongst interested parties, then it will have been worth the effort.

Carl Grundy-Warr (May 1989)

FOOTNOTES AND REFERENCES

- (1) By preparing the coal industry for privatisation the government is effectively ignoring most social costs associated with the restructuring process.
- (2) The SSEB currently owes about £583 million to the European Investment Bank, and a further £579 million in other overseas borrowing, including £385 million in US dollar commercial paper. Nuclear costs, not the higher price of British produced deep mined coal relative to imports since 1982, have been the major source of the SSEB's huge financial debts.
- (3) The Newcastle CHP schemes sponsors include Killingworth-based consulting engineers, Merz and McLellan, in conjunction with Northern Engineering Industries, Sir Robert McAlpine and Press Construction of Darlington. The plant is planned to use waste gas from plants like the Monkton Coke Works or supplies from British Gas. It is claimed by the sponsors that the scheme will create 1,000 man-years of work (Newcastle Journal, 06-09-88:3).
- (4) The Clean Coal Conference was organised jointly by Friends of the Earth and British Coal.
- (5) The CEGB prefer a rival Technology - integrated gasification combined cycle (IGCC), which is essentially an American technology designed by the Electric Power Research Institute (EPRI) in the USA at a demonstration plant at Cool Water, California.

- (6) In 1985, CHP provided 31.7% of electricity in Denmark; 30% in Poland; 25% in Sweden; 11.3% in Italy; 11.2% in West Germany; but only 3.5% in Britain (figures from North East TUSIU).
- (6) Comer's calculations were based on assumptions that the CEGB goes ahead with its PWR programme; all new coal-fired plants are fitted with FGD; the closure of old power stations in the 1990s; and a 1.5 per cent growth in demand for electricity.
- (7) There is considerable scientific debate about the precise levels of carbon dioxide pollution caused by fossil fuel power stations, and other sources of "greenhouse gases" and the build up of carbon dioxide (CO₂) in the atmosphere, such as deforestation, industrial production, and chlorofluorocarbons (CFCs). What is not in doubt is the need to reduce CO₂ emissions from every possible source.
- (8) Pressure groups include Greenpeace and CORE - Cumbrians Opposed to the Radioactive Environment.

TABLE 9:1
Future Scenarios for British Coal

1. Dewhirst and Gladstone (1988)

(a) Pessimistic Low Growth Scenario (9%)

Year	Colliery Numbers	Five Day Week Employees on books	Six Day Week Employees on books
1992	60	63,200	59,300

(b) Optimistic High Growth Scenario (15%)

Year	Colliery Numbers	Five Day Week Employees on books	Six Day Week Employees on books
1992	42	43,000	40,000

2. Prior and McCloskey (1988)

Year	1990 Scenarios						1995 Scenarios	
	1	2	3	4	5	6	7	8
Mines Supplying the CEBB	59	39	30	24	28	45	37	34
CEBB Coal Costs (£ billion)	2.44	2.15	2.06	1.88	1.91	2.04	1.92	1.93

Taken from Prior and McCloskey (1988) Coal on the Market, Financial Times Business Information, Table 1.1, Chapter One.

1. (a) & (b) from Dewhirst and Gladstone (1988) Generating Jobs, Coalfield Communities Campaign, Table 7.5, pg. 32.

TABLE 9:2

Considerations for Policy-Makers:
Further Costs of Colliery Closures

1. Production Considerations

- Finite Resources:
Closure causes sterilization of coal left in the ground
- Irreversibility:
Colliery closure involves a permanent loss of jobs and raw materials

2. Environment Considerations

- Subsidence
- Waste Products (slag heaps)
- The above environmental problems are obstacles to factory location in coal-mining areas
- Large areas of land require reclamation. This involves high costs to change land from mining into agricultural, industrial or recreational space

3. Social Considerations

- Single industry dominance (mining) creates distinctive community values and identification, although there is considerable differentiation between mining communities
- Loss of colliery jobs and incomes damages the basis of a variety of areas of collective self-provision and social welfare amenities
- Many people are forced to leave if they want to find jobs, which inevitably breaks up communities.

Taken from: reports by The Coalfields Communities Campaign.

TABLE 9:3

Markets for North East Coal

Electricity Supply Industry	70%	of total output
(Thameside power stations	30%	of total output
(Local and Yorkshire stations	40%	of total output
Industry	12%	of total output
Export	10%	of total output
Domestic coal	4%	of total output
Coke ovens	2%	of total output
Miners and colliery use	2%	of total output

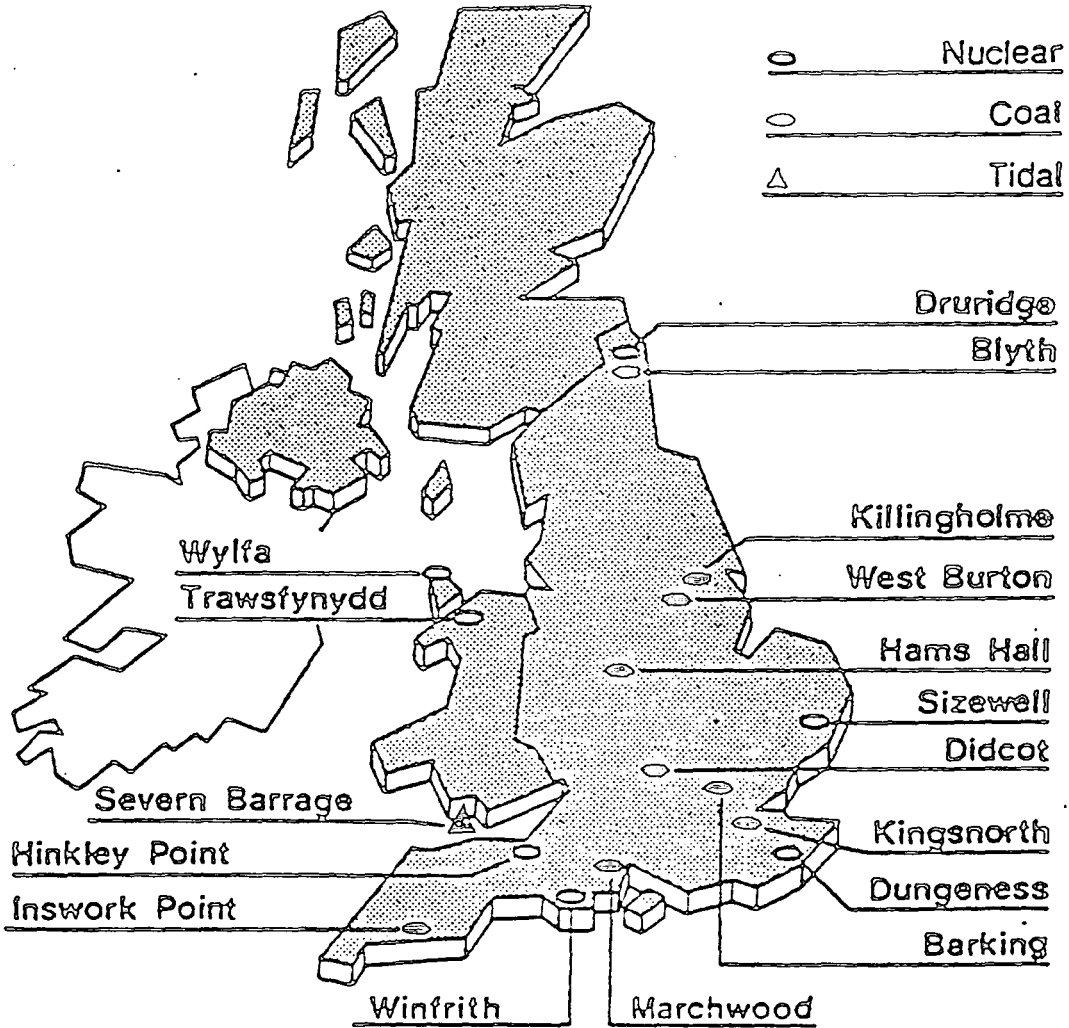
Note: Alcan takes over one million tonnes a year from the neighbouring Ellington Combine to burn in the company's own power station for aluminium smelting. ICI takes over half a million tonnes of coal each year (mostly from opencast sources).

In 1986/7, 1.3 million tonnes - ten per cent of the North East's total disposals - was shipped to power stations in Denmark, France, Portugal, Sweden and West Germany. Smaller contracts included 50,000 tonnes of Durham singles for two Norwegian furnace and ferrous plants, while a Portuguese cement manufacturer took 100,000 tonnes of Northumberland smalls.

Source: Colliery Guardian, December 1987:462.

FIGURE 9.1

Potential new power station sites



Source: CEBB

FIGURE 9.2

Combined Heat and Power

How a CHP power station works

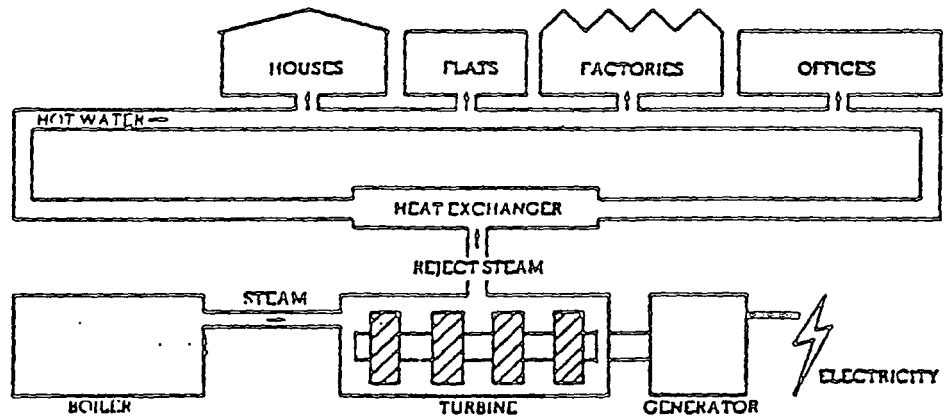
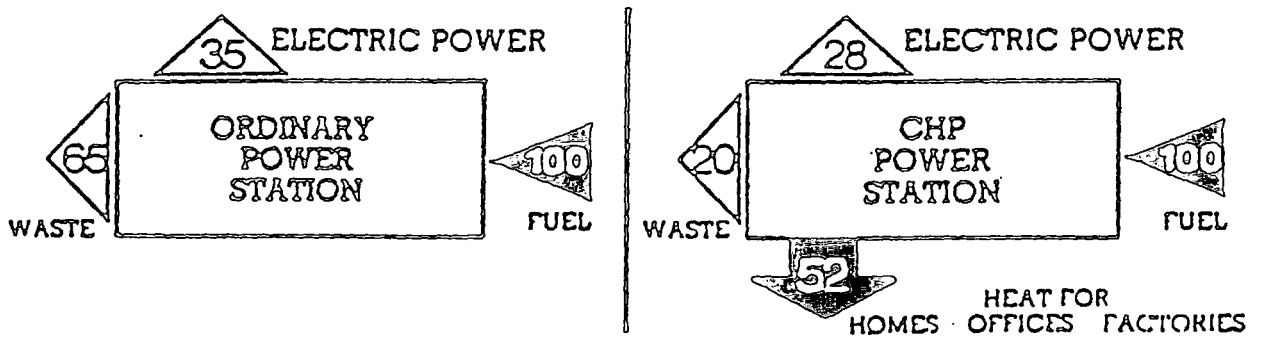


Diagram illustrating benefits of CHP



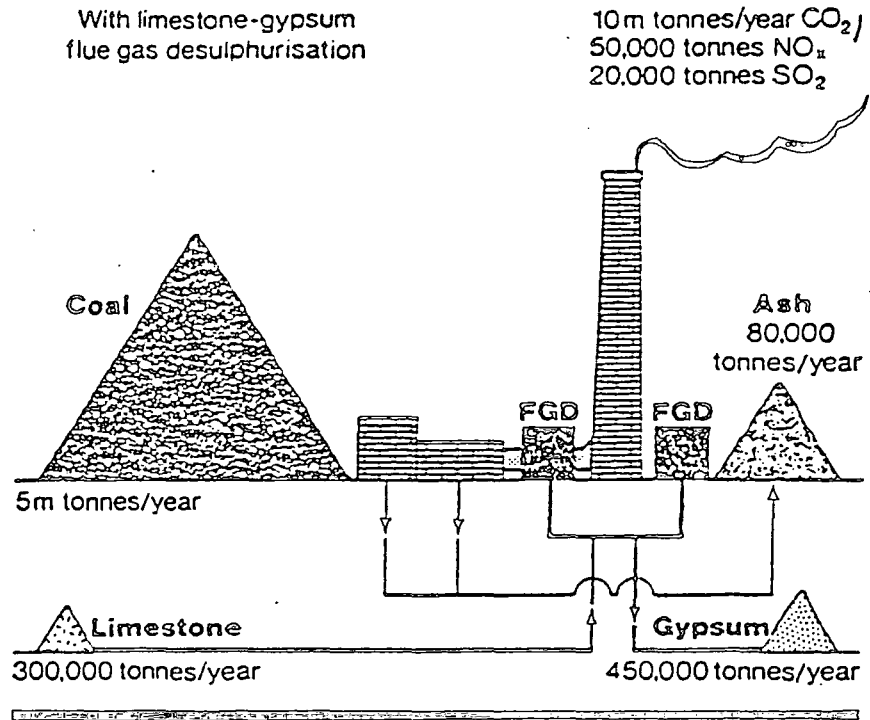
Source: The Charter for Energy Efficiency

FIGURE 9.3

Flue-Gas Desulphurisation

Emission Control Process

Material flows for 2000 MW coal-fired station



Tackling the acid rain problem

○ THE DECISION by the Central Electricity Generating Board in Britain to retrofit flue gas desulphurisation (FGD) plant to three 2,000 MW power stations marks a major step in its bid to tackle the acid rain problem.

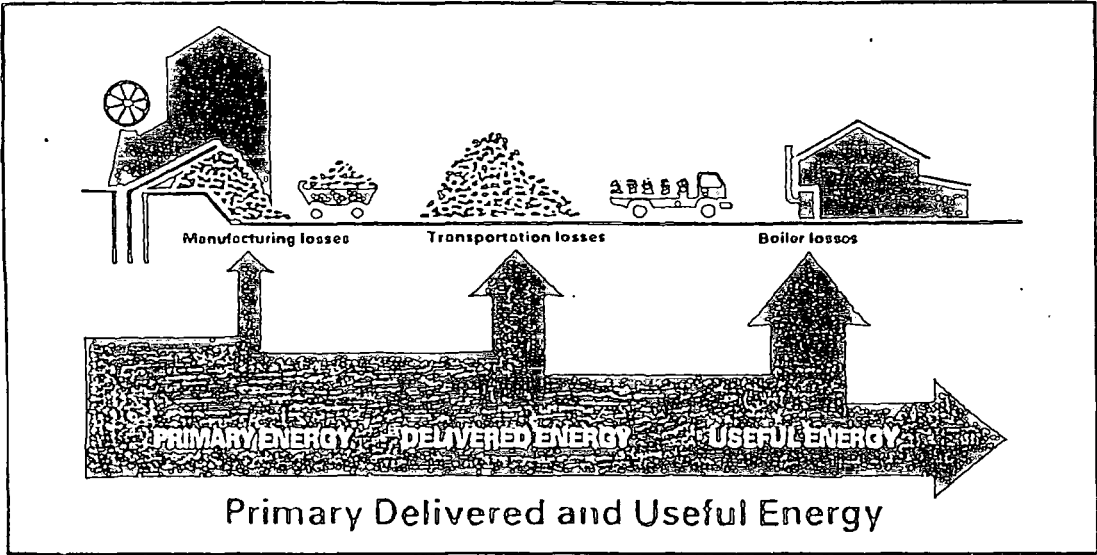
The entire FGD project ultimately aims to cut the sulphur dioxide emissions by 30 per cent by the end of the century. The illustration above showing the limestone-gypsum process repre-

sents one of the choices available to the board.

Limestone in this process is delivered to the site, then ground and slurried. This is then used in a spray tower to contact the gas stream where calcium carbonate reacts to produce calcium sulphate or gypsum. This is then extracted and dewatered by a centrifuge before export from the station. With the FGD process, flue gas goes straight from the induced draught fan to the stack

Source: Electricity Council

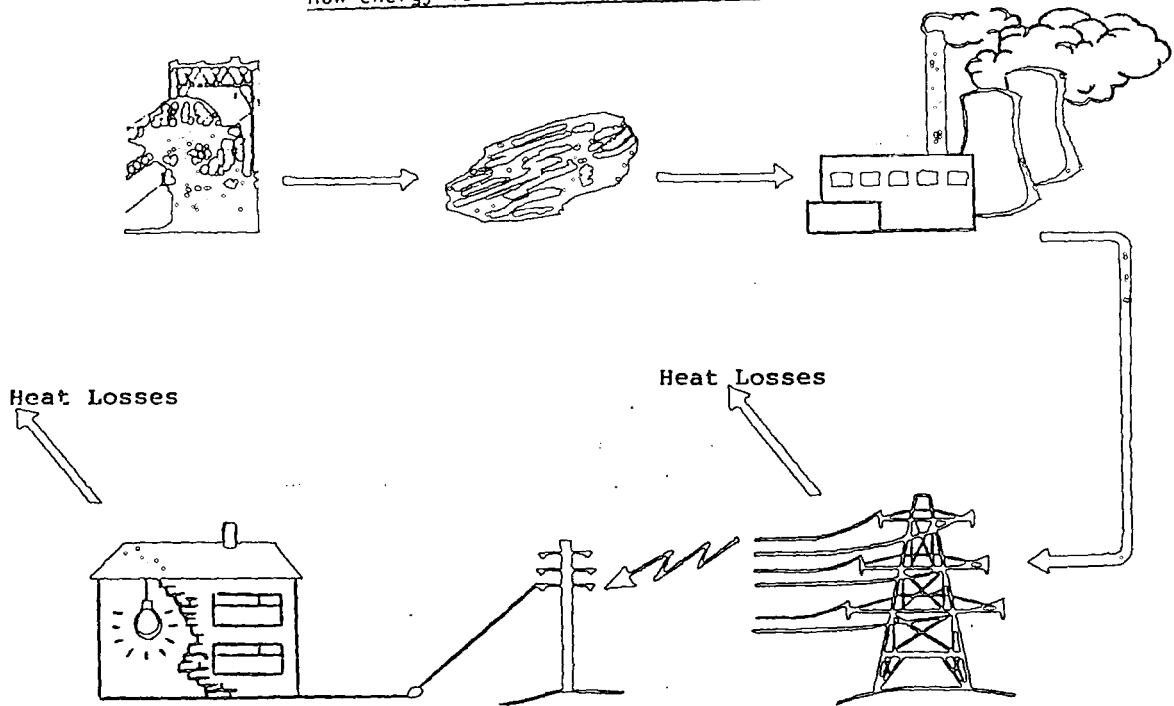
FIGURE 9.4
End-Use Energy Efficiency Energy Losses :
Coal Production to Delivery



Source: Friends of the Earth (1986)

End-Use Energy Efficiency

How energy is lost in conventional coal use



In the provision of light from an ordinary tungsten light bulb, less than 4% of the energy originally available in the primary fuel of coal is utilised. Energy is lost in the following ways:

i)	Original primary energy content of coal in the ground	<u>Units of Energy</u>
		100.00
ii)	Coal extraction (95% efficiency)	95.00
iii)	Coal delivery to power station (34% efficiency)	92.00
iv)	Conversion to heat (100% efficiency) and then electricity in power station (34% efficiency)	31.00
v)	Transmission of electricity through the National Grid to the user (92% efficiency)	29.00
vi)	Conversion to light by tungsten light bulb (13% efficiency)	<u>3.6</u>

Source: Friends of the Earth (1985)

APPENDIX 1

Interviewees - Company Managers and Unionists

Michael Allen, convenor, AEU, Barnsley

John Beveridge, convenor, AEU, Motherwell

John Creaby, Regional Secretary, APEX, Sunderland

Harry Costello, District Secretary, AEU, Wigan

Dick Croft, District Secretary, AEU, Wakefield

Brian Day, District Secretary, AEU, Doncaster

Peter Davidson, convenor, AEU, Ossett

Arthur Edmonson, convenor, AEU, Wakefield

Dave Feickert, Research Department, NUM, Sheffield

Chris Fitzpatrick, Managing Director, Victor Products (now NEI-Victor),
Wallsend

Bill Francis, shop steward, AEU, Wigan

Joe Gilbert, Divisional Personnel Manager, Gullick Dobson, Wigan

Derek Jones, AEU, Worcester

Wilf Jones, former Managing Director of Gullick Dobson, Wigan, and a
member of the National Economic Development Office's (NEDO)
Committee on the Mining Machinery Industry

Peter Lang, AEU, Motherwell

Ray Lawrence, Manufacturing Director, NEI-Parsons, Heaton

Maurice Lee, convenor, AEU, Barnsley

R.B. Lowery, Operations Director, Huwood Limited, Gateshead

A. McKay, Managing Director, EIMCO, Gateshead

Gavin Mackensie, AEU, Glasgow

Piers Merchant, Director of Corporate Publicity, NEI, Newcastle

Alex Milligan, District Secretary, AEU, Motherwell

Leslie Millward, AEU, Worcester

K. Moore, Engineering Director, Huwood, Gateshead

Andrew Murison, General Manager and Managing Director of Mining, Victor
Products (now NEI-Victor), Wallsend

W. Neale, District Secretary, AEU, Gloucester

B. Neville, AEU, Newcastle

Michael Pears, convenor, AEU, Doncaster

J.G. Pickering, Managing Director, NEI Mining Equipment, Sheffield

Dave Reece, AEU, Cheltenham

Friz Schickhoff, Eickhoff (GB), Sheffield

Derek Simpson, District Secretary, AEU, Sheffield

I.M. Thomson, Managing Director, Cabel Belt Limited, Camberley

Kevin Thomson, EEPTU, Leeds

John Walker, Deputy Managing Director, Dowty Mining Equipment, Aschurch

B. Wells, Personnel Director, Fletcher Sutcliffe Wild, Wakefield

Mike Wilson, T& GWU, Barnsley

APPENDIX 2

Researchers and others consulted during research period

Huw Beynon, formerly University of Durham, now University of Manchester

Damian Dewhirst, formerly Coalfield Communities Campaign, Barnsley

Brian Fretwell, Secretary General, Association of British Mining

Equipment Companies (ABMEC), Sheffield

Brian Gladstone, formerly Coalfield Communities Campaign, Barnsley

Les Hamilton, Leeds Polytechnic

Gary Lawson, Senior Research Officer, Engineering Industry Training

Board (EITB), Watford

Brian Parkin, formerly Leeds Polytechnic, now Research Department, NUM

Bob Samson, Editor, Guide to the Coalfields, Redhill

John Tomaney, post-graduate, Centre for Urban and Regional Development

Studies (CURDS), Newcastle

Eric Wade, The Open University, Gosforth

Brian Weekes, Manpower Adviser, National Economic Development Office

(NEDO), also on the NEDO Committee looking at the mining
machinery industry, London

Keith Whitworth, Editor, Colliery Guardian, Redhill

Jon Winterton, University of Bradford

APPENDIX 3

Some of the Main Suppliers

	ACE Conveyor	Harworth
	Alfred Ellis & Sons	Wakefield
	Anderson Strathclyde	Glasgow
*	Anderson Strathclyde	Motherwell
	Atlas Copco (GB) Limited	Hemel Hempstead
	Atlas Copco, H.Q.	Sweden
*	Babcock Mining (Huwood)	Gateshead
	Babcock-Moxey Limited	Gloucester
	RE Barker & Co. Limited	Pontefract
	Becorit Limited	Ilkeston
	BICC Cables Limited	Prescot
	Birtley Engineering	Chesterfield
	Boart (UK) Limited	Sheffield
*	RB Bolton	Consett
	British Engines Limited	Newcastle
*	British Jeffrey Diamond	Wakefield
	Brush Electrical Machines	Loughborough
*	Brush Transformers	Loughborough
	BSC General Steels	Scunthorpe
	BTR Belting	Preston
	WE Burnard	Rotherham
	Butterley Engineering	Derby
*	Cable Belt Limited	Camberley
	Celtite (Selfix) Limited	Alfreton
	Alan Cobham Engineering	Dorset

Communication & Control

Engineering Company Ltd	Nottingham
Core Drill (UK) Ltd	Warwickshire
Cotefield	Sheffield
Croda Application Chemicals	N. Humberside
Crompton Parkinson Cables	Derby
DAC Business Unit (NEI)	Burton-on-Trent
Dale (Mansfield) Ltd	Mansfield
Davis Derby	Derby
* Davy McKee (Stockton) Ltd	Stockton-on-Tees
Dosco Overseas Engineering	Newark
* Dowty Automation Systems	Nottingham
* Dowty Hucknall	Hucknall
* Dowty Meco	Worcester
* Dowty Mining Equipment	Aschurch
Edgar Allen Mining Products	Sheffield
Edwards & Jones Limited	Stoke-on-Trent
EIMCO	Gateshead
English Drilling Equipment Co.	Huddersfield
J.H. Fenner & Co. Ltd	Hull
* Fletcher Sutcliffe Wild	Wakefield
Fluidrive Engineering Co.	Bracknell
GEC Electrical Projects Ltd	Rugby
GEC Mechanical Handling Ltd	Leicester
GEC Switchgear Ltd	Manchester
GKN Colcrete Ltd	Wetherby
* Gullick Dobson	Wigan
Hausherr Ltd	Chesterfield

Hawker Siddeley Dynamics	
Engineering Ltd	Welwyn Garden City
Hayden Nilos Conflow Ltd	Sheffield
Hi-ton International Ltd	Birmingham
* Holywell Mining Group Ltd	Newcastle
Holset Engineering Co.	Halifax
Hunslet (Holdings) plc	Leeds
Huwood Control Systems Ltd	Hucknall
James Fairley Steels	Rotherham
John King & Co. Ltd	Leeds
Joy Manufacturing Co. (UK)	Glasgow
Lindley Flowtech Limited	Bradford
Markham & Company Ltd	Chesterfield
MEDC	Nottingham
Metry Engineering Limited	Chesterfield
Mining Machinery Developments Ltd	Derby
* Mining Supplies (Longwall) Ltd	Doncaster
Mitchell Cotts Mining Equipment	Penkridge
MME Conveyor Care Systems Ltd	Accrington
* MS International plc	Doncaster
The Morley Electrical	
Engineering Co. Ltd	Pudsey
Monson-Tison (Atlas Copco)	Ossett
Needham Bros & Brown Ltd	Barnsley
* NEI Mining Equipment Ltd	Sheffield
Oldham Crompton Batteries	Stockport
OMEC Engineering	Sherburn in Elmet
Padley & Venables	Sheffield
Parsons Chain Company	Stourport-on-Severn

*	PTT (Anderson Strathclyde)	Sheffield
	Pikrose & Company	Manchester
*	Pitcraft Summit Ltd (Dobson Park)	Barnsley
	Pozament Limited	Burton-on-Trent
*	Qualter Hall & Co. Ltd	Barnsley
	Raybrook Precision Hanning	Wakefield
	Scandura Limited	Cleckheaton
	Screen Products Limited	Rotherham
	Thomas Broadbent & Sons	Huddersfield
	Thyssen (Great Britain) Ltd	Llanelli
	Tinsley Wire Ltd	Sheffield
	Transmitton Limited	Ashby de la Zouch
	Trox	Stockport
	Underground Mining Machinery Ltd	Newton Aycliffe
*	Victor Products (now NEI-Victor)	WallSEND
	Walter Frank & Sons	Barnsley
	Webster Machine Company Ltd	Rotherham
	Wheway Becker Ltd	Walsall
	M B Wild & Co.	Birmingham
	Winster Engineering Ltd	Ilkeston
	Wultex Machine Company	Huddersfield

* Denotes Companies visited

APPENDIX 4

QUESTIONNAIRE

This is a standard questionnaire for firms in the UK mining machinery industry as defined by the Standard Industrial Classification, 1980. If it is not possible to give exact answers in all cases, please give your best estimate. Answers will be treated confidentially, and no individual company's data will be used in published reports without the prior permission of that company. Please return the questionnaire as soon as possible. Thank you for your cooperation.

1. What are your main products?

2. Are you a single plant or a multi-plant company?

3. If you are a multi-plant company please name your other plants (or subsidiaries) and the products made there?

Plant locations

Products

Questionnaire

Company Name

.....

4. Approximate UK market shares for your main products?

<u>Product</u>	<u>Market %</u>	<u>1979</u>	<u>1983</u>	<u>1985</u>	<u>Current</u>
----------------	-----------------	-------------	-------------	-------------	----------------

5. Give the main destinations for your products

<u>Country</u>	<u>Industry</u>	<u>% Importance in terms of</u> <u>value of Exports or</u> <u>Proportion of Total Sales</u>
----------------	-----------------	---

6. Please give employment figures for all plants in your company's UK operations at the following dates. Please indicate which plants (or subsidiaries).

<u>Plant/Subsidiary</u>	<u>Mid-1979</u>	<u>Mid-1983</u>	<u>Mid-1985</u>	<u>Current</u>
-------------------------	-----------------	-----------------	-----------------	----------------

Questionnaire

Company Name

.....

7. How many temporary or part-time employees do you employ?

8. How many staff?

9. How many production workers?

BRITISH COAL MARKET

10. Is the British Coal market more important or less important to you now than it was in 1979? And why do you think this is so?

11. Have your total sales to the British coal industry increased or decreased?

a) since 1979 :

b) since 1985 :

Questionnaire

Company Name

.....

12. Have market changes in the British coal industry led to changes in the company's production and marketing strategy? What are the main changes?
13. Have the market changes in the British coal industry affected jobs and employment levels? Please specify.
14. Have there been any job losses as a result?
15. Please add any comments you wish regarding this questionnaire, or make any points you feel are relevant and have not been adequately covered in the questions asked and answered.

Thankyou for your help.

Please return this form to:- Carl Grundy-Warr

Department of Geography

Science Laboratories

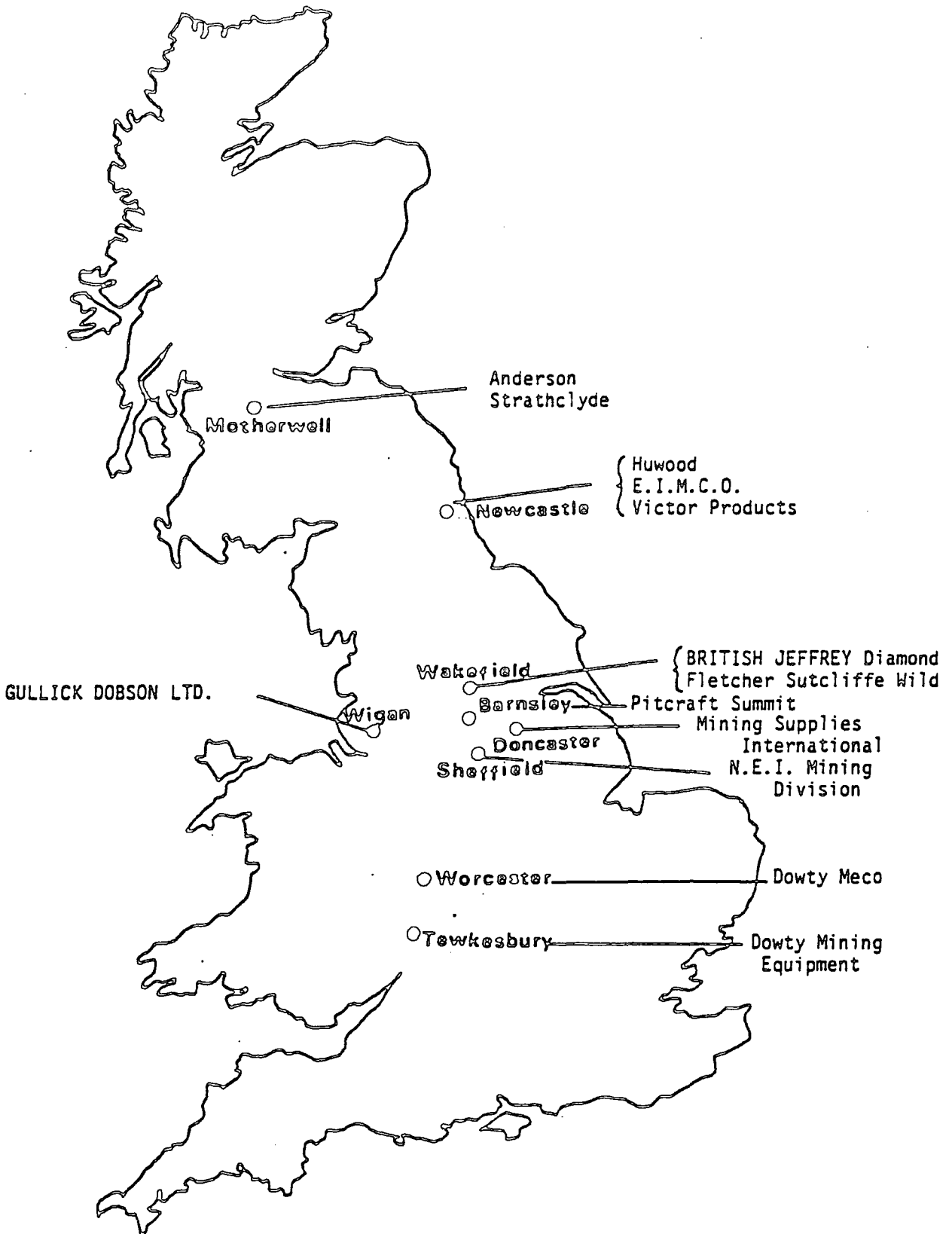
UNIVERSITY OF DURHAM

South Road

DURHAM DH1 3LE

APPENDIX 5

The Locations of Some of the Companies Visited



APPENDIX 6

Copy of a letter from Wilf Miron, Chairman of the East Midlands
NCB and Board Member, to NCB Chairman Derek Ezra.

Courtesy of the NUM

6th December, 1973.

D. J. Barn, Esq., M.B.E.,
43 Eaton Terrace,
LONDON, S.W.1.

Dear Sir,

For reasons which will become obvious to you when you read the enclosed, I am sending this to your private address.

I have set myself the task of putting on paper some thoughts for our future approaches to the coal industry's problems and objectives when the current dispute has ended. I doubt that I shall be in the Board's ranks during the time-scale envisaged, but nevertheless I should be happy to discuss the notes with you if you thought this would be useful. I have decided to approach the matter in this way because, largely in view of the time-scale, I have no aim to find other than to try to see coal develop fully and usefully in the new energy scene.

The enclosed paper is anonymous and I know I can ask you, please, so to treat it.

How far, if at all, any of the above should be applied to Peter Wain's is a 1974 decision is debatable. I have no wish to be a "big gun" (e.g. I guess) Wain's argument in if some of my views are right. This would be of doubtful, my personal value. Changes of coal policies would be

involved in a number of instances: this, as

Doc. How much to fund, the money.

YJB/DO.

Yours ever, David

FF 1412

NATIONAL COAL BOARD
HOBART HOUSE
GROSVENOR PLACE
LONDON SW1X 7AE

01-233 2020

(arranged with
Miss Proctor on
11.12.73 - 12.15pm
on Wed, 19.12.73).

10 Dec 73

CHAIRMAN

My dear Wilfrid,

Many thanks

for yr note received
last Friday.

I have read
it with great
interest & would

very much like
to discuss the
implications with

Could you let me
know when you are
able to fit in a
chat?

Yes,

Stella

1. We must keep in mind that the strategy of the N.U.M.'s Executive will become increasingly politically orientated and that its Left Wing (Communists, Marxists and their ilk, however organisationally fragmented) will maintain a unified strategy towards the ideological end - the overthrow of the present "System".
2. Even if the present wage claim were met in full, this would not satisfy the ultimate political aspirations of the Left Wing. Successively, situations will be created, or will arise, against the desired day of victory when a "New Order" can be established.
3. A generous settlement, a resounding victory in money terms, will serve primarily to reinforce the authority of the "Activists" who have stuck out for it as the men's leaders (e.g. Daly, after Wilberforce, hailed throughout the coalfields, even in Notts., as the great victor) who can "deliver the goods".
4. One has only to examine the present composition of the N.E.C. to see the number of younger men - Communists, Marxists, or the like - who will exercise authority for longer than some of the so-called "moderates" will remain on the N.E.C. Scargill, in his mid-thirties, is a key figure - he aims to succeed Cornley as President: Whelan (Notts.), Tait (York.) and McCahoy (Scotland) are known Communist Party members, the first two are young men: Elyn Williams (South Wales) and Heathfield (North Derbyshire) are younger Marxists or members of "fringe" Marxist groups: Dai Francis (South Wales) is a Communist, much older than the others but likely to be succeeded in a few years by another younger Left Winger as Area Secretary: McClean (Scotland) and Collins (Kent) are Communists and Clark (Scotland) is Marxist: Maile (Staffs.) is Left Wing who votes counter to the Midland Area traditions: Daly's aims are well known.

In the field, at the pits, there are other young men, Marxist indoctrinated, who within the next 10-15 years will emerge as a "new generation", augmented by student (University and Polytechnic) tuition to take the places of older men who will be retiring or moving upwards - already, for example, in Notts. alone one can pinpoint at least four - Tony Lodge (Rufford), Fred Croome (Calverton), Brian Walker (Newstead) and Terry Whelan (Linby - Joe's son).

These Left Wingers now in office, or to achieve office, are not going to be changed; they will not be diverted from their political dedication.

Moreover, over the next 10-15 years or so - even sooner in some cases - the N.U.M.'s own organisation (especially if and when Scargill is at the head - and he has already made noises about it) will change so as to diminish the numbers and strengths of the so-called "moderates" or moderate Areas. Cumberland and North Wales could disappear as Areas: Leicestershire and South Derbyshire could merge: Northumberland and Durham, especially after the now N.C.B. Area reorganisation, could merge also. The cumulative effect would be the number of members on the N.E.C. could be reduced and they are all "moderates".

5. This quasi-political concept serves to demonstrate that the traditionally "moderate" elements in the U.U.M. (including those like Len Clarke who is normally a conventional orthodox local Labour Party figure, as is Syd Vincent and as are the Durham representatives, but all of whom are at present "immoderate" in voting) should be reinforced and restored to their basic anti-Left position. The Left Wing authority of the E.E.C. should be more and more emasculated.
6. Distraction in the numbers of sineworkers, and therefore of membership, would be of some help in this regard, but in the nature of things the reductions are as likely in Lancashire and North Wales ("moderate" Areas) as well as in Scotland and South Wales ("immoderate" Areas) and in Yorkshire numbers may need to increase, certainly to be maintained, subject to observations hereafter - and Yorkshire is likely increasingly to be "immoderate".
7. An alternative would be to try by regrading or redeployment to channel men out of "immoderate" leadership into "moderate" leadership.
8. But these devices are likely to make but marginal differences and in any event we do not want, it is suggested, an industry of fewer men in total if the control of those men is still wholly or mainly in "activist" hands.
9. The large majority of membership of the U.U.M. are Labour Party members who eschew Marxism in any form. It is suggested the aim should be to ensure that such membership has satisfactory, secure and progressive levels of wages and conditions - above all a sense of rewarded security - so as to constrain or neutralise the political ammunition of the Left and the influence of the Marxist.
10. One step in this direction would be to revert to some form of local pit or district incentives based upon Agreements negotiable locally which would restore to some of the traditionally moderate leaders the authority and influence they have increasingly lacked since the N.P.I.A. and the Third Wage Structure, to strengthen them thereby and cause them not to need to ally themselves with the "Leftists" over so great a field as at present. With or without organisational severance of Scotland and Wales as separate operating entities, based on nationalistic considerations, one could foresee, say, Vincent, Malt, Clarke, the Midlands Area representatives (Lally and co.), Spoon and Smith regaining their former stature and authorities as local negotiators and standing up more to the Left Wing at E.E.C. level. These leaders, and there are others like them, are basically Labour Party men, Constitutionalists, non-Marxist, who have found themselves increasingly frustrated by rigid operation of National Agreements giving little or no room for local manoeuvre or negotiation and, in addition, seeing their members' standards reduced as a result of parity, plus Government policies on the control of incomes.
11. The position of E.A.C.O.D.S. vis-a-vis B.A.C.N. must be considered in the total context. The non-supervisory staff who can be channelled into B.A.C.N. the better. E.A.C.O.D.S. is a member of the E.U.C. B.A.C.N. is not. E.A.C.O.D.S. have demonstrated recently that they are less and less a real part of management - they want the status and the money but not the responsibility or the risk. This is not surprising because they are basically still "industrial" grade and identify themselves community-wide and socially inevitably with U.U.M. membership.

Reflections on the Trade Unions situation are left here for the moment and further considerations are not examined.

12. Whatever wages the industry pays, whatever conditions the industry manpower enjoys, if growth is the objective of the national economy and unemployment is held down, mining will not be an attractive occupation (and if there be a large pool of unemployment and general industry does recede, the demand for energy will not be so great). It is doubtful whether, as the years elapse, towards the end of the 20th century, leave alone further ahead, the coalmining industry will get all the men it wants, where and when it wants them.

13. So, it should be the endeavour to get coal, or energy from coal, either without or with a minimum of mineworkers, or with skilled engineers or supervisory staff on the one hand, or by processing or conversion without extraction on the other.

14. This brings one, therefore, to two particular features:-

(a) ROLF (or whatever be its late 1970 equivalent) - remote control, manless mining operations. The early experiments in the 1960's promised well - Nevstead, Ormonde, Woolley were the examples. Perhaps too much "song and dance" was made about the technique - too much, too soon. As in the case of other ideas, the industry's leaders at that time blazoned it and heralded it before it had got properly proved, leave alone established. Certain points of interest, however, emerged from early observations about it. They were:-

(i) the use of ramp plates for clearing up the floor obviating the necessity for any man to work on the face side of the conveyor. The safety aspect of this is obvious. The technique also produces a clean floor on which the conveyor and supports can move over.

(ii) the incorporation of a device to ensure the machine is not derailed.

(iii) the development of an anti-waste flushing curtain attached to the rear of the powered support.

(iv) the development of the automatic steering mechanism for the machine has widespread prospect.

(v) the technique of remote control operating a manless face must include remotely operated haulage.

The timetable for further experimentation in this category is linked with the introduction of the full instrumentation required for study. The lessons and experience gained from the instrumentation connected with this technique will themselves be useful in other fields, for example, remote indicating systems.

Automatic steering ((iv) above) (which presented one of the greatest obstacles) may well have been overcome.

Is it possible to set out the Selby mine(s) on ROLF or its up-to-date equivalent? Should not there be consideration of the re-introduction of the ROLF Wages and Conditions Agreement (dated 12th November 1963, designed for Beverscotes, but subsequently cancelled in the Agreement of 28th June 1971) as appropriate?

ROLF or LHM operations, manless at the coalface, would or could involve only supervisors, engineers, craftsmen, WPIB, so as to reinforce non-union membership but membership of B.A.C.M. or at least N.U.M. Power Group (Ottens or C.C.D.M.

14. (Cont'd)

(b) Underground Gasification. This is looked at askance by the Mining Engineer (please see para. 16 hereafter) and by some Scientists. We are told that U.S.S.R. are not developing it further but U.S.A. are re-examining it. The U.K. should urgently and energetically redouble its efforts. The early experiments at Newman Spinney, North Derbyshire, in the 1950's were unrewarding, but these were "managed" on behalf of the N.C.B. by an Underground Executive without any strong lead. The Chairman, Morval, was weak - the Executive, comprising Bronowski, Clement, Miron, Schumacher and Willett, lacked practical mining engineering skills and never really "got off the ground".

15. Any other uses for coal in situ or without conventional extraction or by other means of extraction - hydraulic mining has been referred to - should be examined as a matter of urgency.

16. As hinted at above in 14(b), the Mining Engineer is conservative, especially one of the older generation, lives for extraction of coal - to use it in situ or to leave it unextracted offends his professionalism. He also likes to control, to manage, men (this is not so much paternalism - although that enters into it - but the desire for authority and command: to demonstrate a superior "know-how"). Norman Siddall may be excepted from this stricture - he is far-sighted, more thoughtful, with a less fixed or prejudiced outlook. En passant, a Mining Engineer was once defined as someone who calls an explosion in a mine an ignition unless it happens in someone else's Area!

17. Therefore, one endeavours now to bring together the foregoing discursive threads. They can and will be shot down, but then let us have something in their place.

The aims should be to:-

(a) limit the future manning of the industry to ~~the~~ restrict, to neutralise, alien or subversive ~~and~~ political influences;

(b) ensure that of those employed in the mining industry the maximum number should be outwith the N.U.M.;

(c) ensure that all employed, whatever be status or grade, have the best and most progressive rewards and conditions of service;

(d) exploit the mineral itself to the full with the minimum of labour.

18. The situation is comparable with the approach to the N.C.B.'s own reorganisation which was started as an embryonic idea between Lord Robens and a few others in the 1960's and developed via the Collins Committee to the eventual new organisation in March 1967 - see Chapter 6 of "Ten Years' Stint" by Lord Robens. As a first step there might be established a high-powered confidential Working Group at Headquarters under Norman Siddall with upon it, say, one Part-time Member (Robinson?), Tregelles, Dunn, a Scientist and members of Finance, Industrial Relations and Staff Departments.

19. But in the words of the famous Reid Report of 1945 "there is no time to be lost". If we do not comprehend the considerations that this note has endeavoured to set out, then there is the great risk that we shall drift from one confrontation to another every 18 months or so. Successive Governments, of any Party, will of necessity have to operate some type of prices/incomes policy as well as an energy policy incorporating minimum coal production and utilization. It will not be good enough, even if it can be achieved without interruption, which is most doubtful, merely to increase overall O.M.C. a couple of hundredweights per annum. Something far more dynamic involving complete reconsideration of the industry's manpower, Trade Union representation, coal extraction or utilization, will be required to augment the fruits of the North Sea (and the Celtic Sea?).
20. An early step could be for Government to announce the establishment of a Commission to examine the future of the coal industry, its certain contribution to the entire energy scene, its manning and the wages, conditions and prospects of its manpower - but that would be in some respects alien to the ideas in this note because it could perpetuate a larger labour force and a stronger M.U.M. with less acceleration in technological advance than the situation, it is submitted, demands.

6th December, 1973.

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